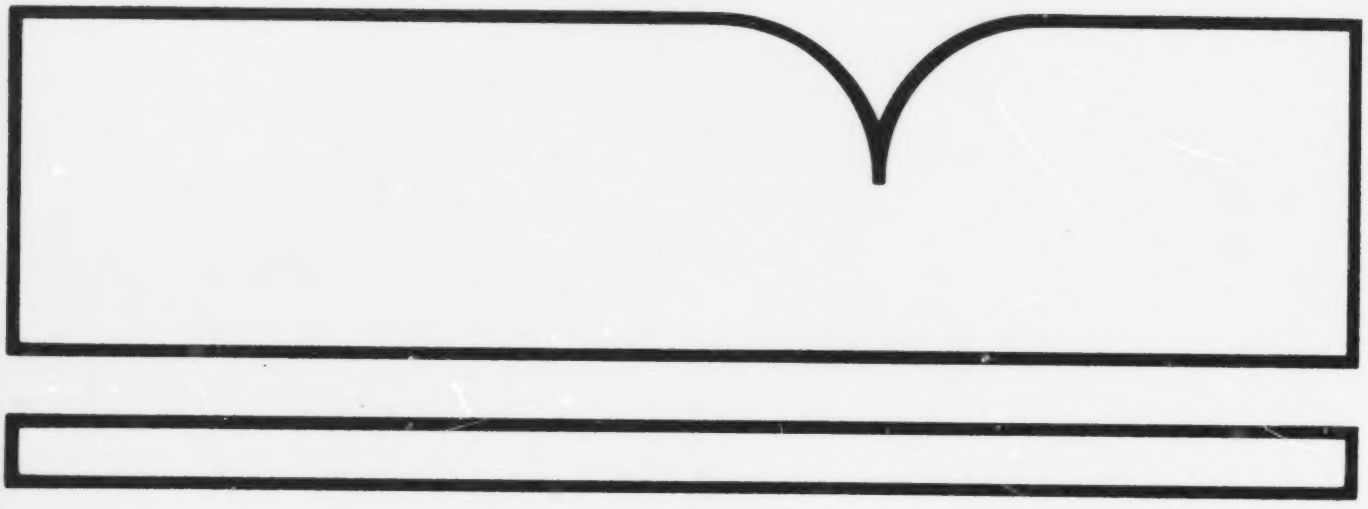
PB90-153743

Superfund Record of Decision (EPA Region 3) Ordnance Works Disposal Areas, Morgantown, WV (First Remedial Action), September 1989

(U.S.) Environmental Protection Agency, Washington, DC

29 Sep 89



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United States
Environmental Protection
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Office of
Emergency and
Remedial Response

EPA/ROD/R03-89/082
September 1989

EPA

Superfund Record of Decision:

Ordnance Works Disposal Areas, WV

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Ordnance Works Disposal Areas site is on the west bank of the Monangahela River in Morgantown, Monongolia County, West Virginia. Several chemical facilities have operated at the site since the early 1940s, producing substances such as hexamine, ammonia, methyl alcohol, formaldehyde, ethylene diamine and coke. This operable unit addresses onsite contamination found in the following areas: an inactive landfill where solid and chemical wastes were disposed of; a scraped area which consists of bare soil adjacent to the landfill where solid wastes were buried; two former lagoon areas which were closed following a cleanup action in 1976; and several streams located in the southern portion of the site. This Record of Decision (ROD) supersedes a 1988 ROD which was rescinded after public comments prompted further investigation. The primary contaminants of concern affecting the soil and sediment are carcinogenic PAHs, and metals including arsenic and lead.

The selected remedial action for this site includes excavation and onsite treatment of approximately 425 cubic yards of inorganic contaminated soil from hot spots in the scraped area and lagoon area using solidification, followed by placement of the treated soil in the landfill before capping; installing a multimedia RCRA Subtitle C cap on the landfill and regrading and revegetation; excavating approximately 13,460 cubic yards of
(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision - Ordnance Works Disposal Areas, WV
First Remedial Action
Contaminated Media: soil, sediment
Key Contaminants: organics (PAHs), metals (arsenic, lead)

b. Identifiers/Open-Ended Terms

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EPA/ROD/R03-89/082
Ordnance Works Disposal Areas, WV
First Remedial Action

16. Abstract (Continued)

organic-contaminated soil and sediment from the lagoon area, scraped area, and streams, with onsite treatment by bioremediation in a treatment bed; ground water, surface water, and sediment monitoring; and implementing deed restrictions to prohibit residential and industrial construction at the site. A contingency remedy has been selected which would include soil washing of contaminated soil as the principal treatment. The estimated present worth cost for this remedial action is $8,332,000, which includes annual O&M costs of $88,200 for 4 to 10 years.

N O T I C E

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RECORD OF DECISION

FOR

ORDNANCE WORKS DISPOSAL AREAS SITE
OPERABLE UNIT NO. 1
MORGANTOWN, WEST VIRGINIA

RECORD OF DECISION
ORDNANCE WORKS DISPOSAL AREAS SITE
OPERABLE UNIT NO. 1

DECLARATION

Site Name and Location

Ordnance Works Disposal Areas Site
Operable Unit No. 1
Morgantown, West Virginia

Statement of Basis and Purpose

This decision document presents the Preferred Remedial Action and Contingency Remedial Action for a portion of the Ordnance Works Disposal Area Site referred to as Operable Unit No. 1 and further described herein. This document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended; and, to the extent practicable, the National Contingency Plan, 40 C.F.R. Part 300. The decisions contained herein are based on information contained in the administrative record established for this site.

The State of West Virginia has concurred on the Preferred Remedial Action and Contingency Remedial Action.

Recision of Previous Record of Decision

This document supersedes the March 31, 1988 Record of Decision developed for Operable Unit No. 1 of the Ordnance Works Disposal Areas Site.

Assessment of the Site

Actual or threatened releases of hazardous substances from Operable Unit No. 1 of the Ordnance Works Disposal Areas Site, if not addressed by implementing the response actions selected in this ROD, may present a current or potential threat to public health or the environment.

Scope of this Record of Decision

The Preferred Remedial Action and Contingency Remedial Action selected herein address contamination present at a portion of the Ordnance Works Disposal Areas site referred to herein as Operable Unit No. 1. Additional studies may be conducted in areas of the site outside the Operable Unit No. 1 area. This document is not intended to select a remedy or remedies for portions of the site outside the Operable Unit No. 1 area, and issuance of this

document shall in no way affect EPA's authority to conduct response actions in such areas.

Description of the Remedy

EPA has selected, and the State of West Virginia has concurred in the selection of, a Preferred Remedial Action and Contingency Remedial Action for Operable Unit No. 1 of the Ordnance Works Disposal Areas site from among the alternatives considered in the Focused Feasibility Study. Both the Preferred Remedial Action and Contingency Remedial Action are considered comparable in remediating contamination and reducing risks associated with exposure to contaminated materials present within Operable Unit No. 1.

The major components of the Preferred Remedial Action and Contingency Remedial Action are as follows:

Preferred Remedial Action: Alternative 8B

- Installation of a multi-media RCRA Subtitle C cap on the landfill and regrading/revegetation to control surface run-on and run-off.

- Excavation of contaminated inorganic hot spots exceeding risk-based cleanup levels from the lagoon area and scraped area before bioremediation.

- Onsite treatment of soils excavated from inorganic hot spots using solidification and placement of non-hazardous treated material in the landfill before capping.

- Excavation of organic contaminated soils and sediments exceeding risk-based cleanup levels from the scraped area, lagoon area, and streams.

- Treatment of excavated soils and sediments with organic contaminants using bioremediation in a treatment bed within the associated area of contamination.

- Short-term environmental monitoring to ensure the effectiveness of the remedial action.

- Groundwater monitoring in the immediate vicinity of the landfill.

- Deed restrictions to prohibit residential and industrial construction in the landfill area and residential construction in the remaining areas.

Contingency Remedial Action: Alternative 6

- Installation of a multi-media RCRA Subtitle C cap on the landfill and regrading/revegetating to control surface run-on and run-off.

- Excavation of contaminated soils and sediments exceeding risk-based cleanup levels in the scraped area, lagoon area, and streams.

- Onsite treatment of excavated soils and sediments using soil washing. Excavated areas will be backfilled with remediated non-hazardous soils, regraded, and vegetated.

- Short-term environmental monitoring to ensure the effectiveness of the remedial action.

- Groundwater monitoring in the immediate vicinity of the landfill area.

- Deed restrictions to prohibit industrial and residential construction in the landfill area and residential construction in remaining areas.

Conditions Triggering Implementation of Contingency Remedial Action

The Preferred Remedial Action selected by EPA for implementation at Operable Unit No. 1 is Alternative 8B. If, however:

1. Predesign studies show that treatment levels specified in the ROD cannot be achieved using bioremediation techniques within a reasonable time frame; or

2. Responsible parties elect to design, implement, and finance Alternative No. 6 at Operable Unit No. 1; or

3. Information received during the bidding process suggests that the costs of implementing Alternative No. 8B are significantly higher than originally estimated;

then Alternative No. 6, the Contingency Remedial Action, shall be the remedial action selected by EPA for implementation at Operable Unit No. 1 of the Ordnance Works Disposal Areas site.

Statutory Determinations

The Preferred Remedial Action (Alternative 8B) and Contingency Remedial Action (Alternative 6) are protective of human health and the environment, comply with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and are cost-effective. The Preferred Remedial Action and Contingency Remedial Action utilize permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfy the statutory preference for remedies that employ treatment that reduce toxicity, mobility, or volume as a principal element.

Because implementation of either the Preferred Remedial Action or the Contingency Remedial Action will result in hazardous substances remaining onsite above health based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Edwin B. Erickson
Regional Administrator

9/29/89
Date

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RECORD OF DECISION
ORDNANCE WORKS DISPOSAL AREAS SITE
OPERABLE UNIT NO. 1

DECISION SUMMARY

I. SITE NAME, LOCATION, AND DESCRIPTION

The Ordnance Works site is located in Monongalia County on the west bank of the Monongahela River in Morgantown, West Virginia (see Figure 1). The site is situated in and around a tract of property formerly owned by the United States and used for the production of various chemical substances. Significant features include an industrial complex (largely abandoned) in the northern and central portions of the property and waste disposal areas--including a landfill, "scraped" area, former lagoons, and several streams--located at the southern end of the tract. This Record of Decision identifies remedial actions selected for implementation at the waste disposal areas, which areas are collectively referred to herein as "Operable Unit No. 1," at the southern portion of the site.

The topography surrounding the site is mountainous, dominated by the Chestnut Ridge, a long anticlinal mountain in the Allegheny Mountain Range located seven miles east of the City of Morgantown. Surface elevations at areas within the site investigated by EPA range from 975 feet mean sea level ("msl") to 1010 feet msl. The Monongahela River is adjacent to the site at 825 feet msl. A fairly steep cliff separates the river from the waste disposal areas at the site.

Ground water at the Ordnance Works site occurs in shallow, unconsolidated sediments in a discontinuous localized perched condition and in the deeper bedrock as a regional aquifer. Ground water flows eastward toward the Monongahela River. The City of Morgantown (population 31,000) operates a drinking water intake one mile downstream of the site which supplies the city with approximately 70% of its potable water.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Ordnance Works site has contained an active chemical production facility since the early 1940's. In December 1943, the United States purchased approximately 850 acres at this location from E.I. duPont de Nemours and Company ("DuPont"). Through 1945, DuPont operated a facility it had constructed on the site to produce hexamine from ammonia and methanol for the

BASE MAP IS A PORTION OF THE U.S.G.S. MORGANTOWN SOUTH, WV QUADRANGLE (7.5 MINUTE SERIES, 1957, PHOTOREVISED 1976). CONTOUR INTERVAL TWENTY FEET.

SITE LOCATION MAP
MORGANTOWN ORDNANCE WORKS SITE
MORGANTOWN, WEST VIRGINIA

FIGURE 1

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Department of War (now Department of Defense). From 1945 to 1962, when the United States sold the tract to the Morgantown Community Assocation, Inc. (which subsequently sold the property to Morgantown Ordnance Works, Inc.), a succession of private companies including Sharon Steel, Heyden Chemicals, and Olin Matheson produced such substances as ammonia, methyl alcohol, formaldehyde, hexamine, ethylene diamine, and coke at the facility.

In 1964, Weston Chemical Company purchased a small parcel from Morgantown Ordnance Works, Inc. Weston Chemical Company subsequently expanded it operations at the site. This expansion continued after 1969, when the Borg-Warner Corporation purchased Weston Chemical Company, with the result that Borg-Warner ultimately operated two plants (identified in Figure 1 as the "North" and "South" plants) on company-owned property amounting to approximately 62 acres. In 1988, General Electric purchased Borg-Warner's operations at the site. The General Electric facilities are currently active.

Much of the property in and around the industrial complex in the northern and central portion of the site and the waste disposal areas located in the southern portion of the property is presently owned by Morgantown Industrial Park Associates, Limited Partnership ("MIPA"). From May-October 1984, MIPA conducted a response action during which drums containing PCBs and contaminated soils were removed from the property and disposed at an approved disposal facility.

In January 1988, EPA completed a Remedial Investigation and Feasibility Study ("RI/FS") during which 200 samples from soil, sediment, ground water, and surface water were collected and analyzed. The majority of these samples were taken from the waste disposal areas at the southern end of the site. In March, 1988 EPA issued a Record of Decision ("ROD") selecting a remedy for implementation at these waste disposal areas. The ROD additionally announced EPA's intention to conduct further studies in the industrial complex areas in the northern and central portions of the site.

Subsequent to signing this ROD, EPA opened a comment period for responsible parties. In response to comments received from several parties, EPA performed a Focused Feasibility Study to re-evaluate the remedial action alternatives considered in the March 1988 ROD and to perform a risk-based analysis of cleanup levels. This study was completed June 1989.

III. COMMUNITY RELATIONS HISTORY

EPA held a public comment period on the RI/FS (released January 1988) and first proposed plan from February 16, 1988 through March 16, 1988. EPA issued a Record of Decision on March 31, 1988, selecting a remedy for implementation at Operable Unit No. 1.

In November/December 1988, EPA opened a limited comment period for responsible parties associated with the Ordnance Works site. In response to comments received from several parties, EPA performed a Focused Feasibility Study (FFS) to re-evaluate the remedial action alternatives considered in the March 1988 ROD and to perform a risk-based analysis of cleanup levels. The FFS was completed June 30, 1989 and a new proposed plan for Operable Unit No. 1 was issued thereafter. A public comment period was held July 3 through August 2, 1989, and a public meeting was held in Morgantown, West Virginia on July 12, 1989 at the Morgantown Public Library. At this meeting, representatives from EPA and the State of West Virginia answered questions about problems at the site and the remedial alternatives under consideration. A response to the comments received during this period is included in the Responsiveness Summary contained in this Record of Decision.

All documents predicating the remedy selection decisions contained in this Record of Decision are included in the Administrative Record for this site and can be reviewed or referred to for additional information.

IV. SCOPE AND ROLE OF RESPONSE ACTION

This Record of Decision selects a Preferred Remedial Action and Contingency Remedial Action for a portion of the Ordnance Works Disposal Areas Site referred to as Operable Unit No. 1. The January 1988 RI/FS performed at the site documents the release/threatened release of hazardous substances into the environment at locations outside the Operable Unit No. 1 area. These releases/threatened releases, which have not been studied in a comprehensive fashion, may be the subject of further response actions at the site and are not addressed by this Record of Decision.

The contaminated areas within Operable Unit No. 1 were determined to be a principal threat because of the potential for direct dermal contact and ingestion of soil and sediments. The remedial objectives are to remediate contaminated soil and sediments through combined containment and treatment alternatives, to prevent current and future exposure, and to prevent contaminant migration to surface waters.

EPA considers the entire Operable Unit No. 1 study area to be contaminated with the same contaminants, i.e., carcinogenic polynuclear aromatic hydrocarbons (CPAHs), arsenic, and other inorganic metals. For the purposes of evaluating remedial alternatives and developing cost data, the soil and sediment volume of areas with contaminant levels exceeding recommended cleanup levels was determined based on data available in the Remedial Investigation (Weston 1988). These "base case" remediation volumes are shown in Table 1. A total of 43,000 cubic yards of contaminated soils and sediments (13,885 cubic yards outside the landfill) will be remediated.

V. SITE CHARACTERISTICS

The contaminants of concern for Operable Unit No. 1 are carcinogenic polynuclear aromatic hydrocarbons (CPAHs), arsenic, lead, copper, chromium, mercury, zinc and cadmium. The CPAHs and arsenic are carcinogens. The other inorganic compounds are systemic toxicants. The affected media are soil, sediments, and onsite surface water.

The waste management areas of concern that will be remediated are described as follows:

"Scraped Area"

The scraped area consists of bare soil, adjacent to the landfill, where solid wastes (construction debris, oil-like stained soils, and catalyst pellets) were buried. Chemical analysis of soil and fill in the scraped area detected concentrations of arsenic at a concentration of 114 mg/kg in test pit 2, and CPAHs at concentrations of 50.7 mg/kg and 35.6 mg/kg in test pits 3 and 5, respectively.

Landfill

The currently inactive landfill was formed where various solid and chemical wastes were disposed of in an existing ravine. The landfill was reportedly an active disposal area from 1942 until 1962. The landfill depth ranges from 16 to 20 feet. Waste materials that were identified typically included construction debris, slag, ash, and catalyst pellets. Arsenic was found at concentrations ranging from 6.9 mg/kg to 300 mg/kg; CPAHs ranged from 9.6 mg/kg to 1,700 mg/kg; lead ranged from 10 mg/kg to 2,000 mg/kg; and copper ranged from 21 mg/kg to 67,800 mg/kg.

TABLE 1

Summary of Contaminant Volumes

Contaminant Volumes, Cubic Yards

Source Area	CPAHs	CPAHs and Inorganics	Inorganics
Scraped Area	2,010	—	360
Landfill	--	29,150	--
Lagoon Area	10,950	—	65
Stream Sediments	500	—	--
TOTAL	13,460	29,150	42[illegible]

Former Lagoon Area

Two former lagoons located adjacent to the landfill were used for waste disposal until the lagoon residues were removed and the lagoons were closed as part of a cleanup action in 1976. This area is relatively flat with a cinder-like surface layer and sparse vegetation. Metals concentrations are found in relatively low levels in the former lagoon areas. Cadmium and lead were found above the action levels in one location (soil boring 09) with concentrations of 1,400 mg/kg and 2,300 mg/kg, respectively. CPAHs have been identified at this location at very high concentrations. The concentration of CPAHs ranged from 4.6 mg/kg to 47,800 mg/kg. An oily, stained cinder material was observed in areas where CPAHs were detected.

Surface Water/Sediments

Analytical data from surface water indicate that the contaminants of concern (i.e., CPAHs, arsenic, lead, copper, chromium, zinc, cadmium, and mercury) are relatively low in concentration; therefore, this medium is not currently a primary migration pathway for site contaminants. CPAHs were detected at relatively high concentrations at sediment sampling locations downgradient of the scraped area and landfill: stream one, 37 mg/kg and 280 mg/kg CPAH; stream two, 111 mg/kg CPAH; stream three, 318 mg/kg.

Groundwater

Several small perched aquifers that exist throughout the site were not sampled, due to their small volumes. However, these perched aquifers surface as streams, which were sampled and found not to be contaminated. Groundwater occurs in the sandstone bedrock under confined conditions. The flow direction is easterly toward the Monongahela River. No direct groundwater users have been identified between the waste management areas and the Monongahela River. Only iron and manganese were detected in groundwater at levels above drinking water standards. The Environmental Assessment (EA) conducted by EPA (Weston 1988) indicates that the concentrations of these constituents do not affect the drinking water source (i.e., the Monongahela River) and that groundwater is not a migration pathway of concern for site contaminants.

VI. SUMMARY OF SITE RISKS

Risk Assessment

The March 1988 ROD for the Ordnance Works site established remedial action objectives which identified contaminants and media of concern, potential exposure pathways, and cleanup levels and remediation goals. A risk assessment was performed for both present and future potential exposure pathways. The principal threat to human health and the environment was determined to be soil and sediment contamination. Ground water was not determined to be a contaminant exposure pathway. The selected remedy, onsite incineration and containment, focused on source control of soils and sediments. The remediation goal was to achieve a risk-based cleanup level for soils and sediments of 20 mg/kg arsenic and 26 mg/kg CPAHs based on a future exposure scenario for onsite construction workers.

Since no new Remedial Investigation was conducted, EPA believes it is appropriate to use the same media of concern and potential exposure pathways to evaluate remedial alternatives and conduct a risk assessment to determine remediation goals in this ROD. EPA has increased the range of remedial alternatives investigated and amended cleanup levels to be achieved for source control of soils and sediments in this ROD based on the Focused Feasibility Study (NUS, June 1989) and Proposed Plan issued in July 1989.

As part of the Focused Feasibility Study, EPA performed a new risk assessment to re-evaluate the potential impacts on public health and the environment that may result from release of contaminants from Operable Unit No. 1 at the Ordnance Works site. As part of the risk assessment, EPA evaluated cleanup levels for eight contaminants because of their high concentrations in soil/sediment and toxicity relative to potential exposure pathways: seven inorganic compounds (arsenic, cadmium, chromium, copper, lead, mercury, and zinc) and carcinogenic polynuclear aromatic hydrocarbons (CPAHs). CPAHs and arsenic are carcinogens. The other contaminants are systemic (non-carcinogenic) toxicants.

Selection of cleanup levels requires consideration of exposure conditions (i.e., physiological characteristics of individuals exposed, circumstances and extent of exposure, etc.) and exposure media. Potential exposure pathways are shown in Table 2. Potential exposure in non-residential areas such as the Ordnance Works site occurs through different pathways than in residential settings. While ingestion may be the principal exposure pathway of concern in residential settings due

to the potential for regular contact by children who may consume quantities of soil, in most non-residential areas there is less opportunity for this type of regular exposure by small children to occur. Because the contaminated areas are located within an industrial park, EPA based its risk analysis on a future use scenario for protection of construction workers who would be exposed to soils and sediments during the construction of an industrial facility following completion of site remediation. Three exposure pathways were considered appropriate for this exposure scenario: ingestion of soil, dermal contact, and inhalation of dust. Construction workers were assumed to make 100 visits to the construction site and ingest 100 mg of soil per visit. Dermal exposure assumed 10 percent of total adult surface area exposed per visit. Workers were assumed to inhale 20 cubic meters air per site visit with a ratio between soil and air concentration of 1.5x10+6 mg/kg soil per ug/cubic meter air. All three exposure routes were considered in combination. Carcinogen exposures were averaged over a 70-year lifetime.

Excess lifetime cancer risks for carcinogens were determined by multiplying the intake contaminant level with the cancer potency factor. These risks are probabilities generally expressed in scientific notation (i.e. 1x10-6 or 1.00E-06). An excess cancer risk of 1x10-6 indicates that an individual has a one in one million chance of developing cancer as a result of site related exposure to a carcinogen over a 70-year lifetime under specific exposure conditions at the site. Potential concerns for effects from noncarcinogens is expressed by calculating a hazard index. The hazard index provides a useful reference point for determining the potential significance of contaminant exposure. A hazard index that exceeds 1.0 is unacceptable. A summary of the risk assessment calculations is shown in Table 3. Since cleanup levels are for protection of workers during construction of an industrial facility, and may or may not provide equivalent protection under residential exposure conditions, deed restrictions are considered necessary to prevent the development of a residential area in this location.

TABLE 2

POTENTIAL EXPOSURE PATHWAYS
MORGANTOWN ORDNANCE WORKS SITE
MORGANTOWN, WEST VIRGINIA

Exposure Medium	Potential Contaminant Source	Transport Mechanism	Potential Exposure Point/Exposed Population	Potential Exposure Route
Current-Use Scenario				
Sediments	Leachate seeps, surface soils	Surface-water runoff, erosion	Consumers of fish, aquatic life	Ingestion of sediment or of fish, adverse effects on aquatic life
Soil	Contaminated soils	Direct Contact	Unauthorized persons	Ingestion of Soil, dermal contact
Future-Use Scenario				
Soil	Contaminated soils	Direct contact during construction	Onsite construction workers	Ingestion of soil, dermal contact
Air	Contaminated soils	Dust generation during construction	Onsite construction workers	Inhalation of dust

TABLE 3

CALCULATION OF THE SPECIFIC CLEANUP LEVELS FOR THE AREAS OF CONCERN

MORGANTOWN ORDNANCE WORKS SITE
MORGANTOWN, WEST VIRGINIA

Carcinogens

Indicator Chemicals	Chemical Concentration of 1.00 E-06 Risk in Absence of Other Contaminants (mg/kg)	Acceptable Risk	Revised Cleanup Levels (mg/kg)
Arsenic	8.88E + 01	1.00E-06	8.88E + 01
CPAHs	4.47E + 01	1.00E-06	4.47E + 01
Total Risk to the Area		1.00E-06	

Systemic Toxicants (Noncarcinogens)

Indicator Chemicals	Chemical Concentration of 1.00 E-06 Risk in Absence of Other Contaminants (mg/kg)	Hazard Index	Revised Cleanup Levels (mg/kg)
Cadmium	1.76 + 02	1.00E + 00	6.42E + 02
Chromium	3.04E + 03	1.00E + 00	1.11E + 04
Copper	2.25E + 04	5.00E-01	4.11E + 04
Lead	N/A	N/A	5.00E + 02
Mercury	1.82E + 02	5.00E-01	3.32E + 02
Zinc	1.28E + 05	5.00E-01	2.34E + 05
Total Hazard Index for the Area		1.00E + 00	

Notes:

(1) The overall risk associated with the site is 1E-06, a realistic future scenario due to the site's current use.

(2) Because oral exposure to inorganic arsenic has been associated with nonlethal forms of skin cancer only, EPA presumes that the risks associated with CPAHs and arsenic are not additive.

(3) EPA has evidence that lead and mercury attack the same target organs in animals; therefore, their risks should be additive.

(4) EPA has evidence that copper and zinc attack the same target organs in animals; therefore, their risks should be additive.

(5) The exposure of systemic toxicants is "time-weighted." This is the exposure that should occur over a period of 1 year.

(6) Because lead and mercury interact in animals, the lead cleanup level is calculated at 500 mg/kg rather than 1,000 mg/kg (1,000 mg/kg is EPA policy for industrial ar

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Cleanup Levels

Cleanup levels for soil and sediments for five indicator contaminants are shown in Table 4. Cleanup levels are not proposed for mercury, zinc, and chromium (see Table 3) because the maximum concentrations detected during the Remedial Investigation are at concentrations that are below the risk-based cleanup levels. The cancer risk from exposure to CPAHs and arsenic will be 1x10-6 and is within EPA's acceptable exposure range of 10-4 to 10-7.

TABLE 4

Contaminant	Cleanup Level (mg/kg)
Carcinogenic Polynuclear Aromatic Hydrocarbons	44.7
Arsenic	88.8
Cadmium	642
Lead	500
Copper	41,100

Remedial Action Goals

The specific remedial action goals for source control of soils and sediments are:

- Reduce or eliminate organic contaminants in surface and subsurface soils and sediments that exceed the risk-based cleanup level for CPAHs of 44.7 mg/kg.
- Reduce or eliminate inorganic contaminants in surface and subsurface soils and sediments that exceed risk-based cleanup levels for arsenic (88.8 mg/kg); cadmium (642 mg/kg); lead (500 mg/kg); copper (41,100 mg/kg).
- Reduce or eliminate the threat of migration of contaminants from the landfill.

VII. DOCUMENTATION OF SIGNIFICANT CHANGES FROM PROPOSED PLAN

EPA has selected a Preferred Remedial Action and Contingency Remedial Action from among the two alternatives announced in the Proposed Plan as preferred remedial alternatives.

VIII. DESCRIPTION OF ALTERNATIVES

Alternatives were evaluated to select a permanent source control remedy for Operable Unit No. 1 of the Ordnance Works Disposal Areas site consisting of an inactive landfill, two former lagoons and the surrounding area, a waste disposal area referred to as the "scraped" area, and sediments from three small streams that transect the area. The alternatives describe final remedial actions for contaminated soils and sediments. The alternatives that were evaluated and net present worth costs are:

Alternative 1: **No Action with Site Control (All Areas)**
$3,053,000

- Install fence around entire area.
- Deed restrictions to prevent future development.
- Implementation of a long term monitoring program.

The no action alternative does not provide adequate protection of human health and the environment. Current and future environmental risks would still exist from site runoff and access to the site by wildlife. The no action alternative would not permanently and significantly reduce the volume, toxicity, or mobility of hazardous waste at the site; would not meet applicable or relavant and appropriate federal and state standards, requirements, criteria, or limitations; and does not utilize permanent treatment technologies to the maximum extent practicable as mandated by CERCLA. The no action alternative furthermore does not meet cleanup levels based on EPA guidance, criteria, and advisories.

Alternative 2: Capping with Surface-Water Controls (All Areas) $4,713,000

- "RCRA" (Resource Conservation and Recovery Act) equivalent cap over the contaminated areas.
- Dredge and dewater contaminated sediments and place in onsite existing landfill prior to capping.
- Surface management for erosion and sediment control.
- Monitoring program for groundwater, surface water, and sediments.
- Deed restrictions to prevent future development.

Alternative 2 includes installation of a cap over contaminated areas not meeting recommended cleanup criteria; the cap would comply with recommended RCRA design guidance for hazardous waste land disposal facilities. This total area is estimated to be four acres.

Surface water controls, such as drainage ditches, and regrading of the surrounding area and cap, would be implemented to control run-on of surface water. Contaminated stream areas would be dredged and placed in the landfill before capping. A short-term toxicity monitoring program (bioassays) would be conducted before, during, and after the remediation as one measure of effectiveness. Because waste is left onsite, a monitoring program for groundwater, surface water, and sediments is recommended after cap installation. Deed restrictions are proposed to prevent future residential and industrial development.

Alternative 2 does not permanently and significantly reduce the mobility, volume or toxicity of hazardous waste at the site, does not utilize permanent treatment technologies to the maximum extent practicable, and does not satisfy CERCLA's preference for remedies that employ treatment as a principal element.

Alternative 3: **Soil Washing (All Areas)**
$17,308,000

- Excavate contaminated soils for soil washing (all areas).

- Onsite treatment and disposal of soils and sediments using soil washing techniques.

- Toxicity testing (bioassays) for Streams 1,2, and 3 before, during, and after remedial action.

- Deed restrictions to prevent future residential development.

This alternative is a permanent treatment technology based on a commercially available soil washing process which uses solvent extraction to remove contaminants from soil. Contaminated soil and sediments (approximately 42,610 cubic yards total) would be treated onsite via soil washing and the treated material returned to the original excavated areas (assuming that EP toxicity testing shows that the treated soil is not hazardous). Since all areas would be remediated, no long-term site monitoring is required. The soil washing process generates two liquid waste streams for disposal. A concentrated liquid organic residue waste stream would be disposed by offsite incineration. The wastewater stream would be treated onsite using a chemical/physical treatment process and any sludge also disposed offsite. A treatability study will be conducted to determine design criteria for the soil washing and waste treatment processes.

Alternative 4: **Soil Washing (Landfill and Inorganic Hot Spots) and Bioremediation (Lagoon Area, Sediments, and Organic Hot Spots)**
$16,124,000

- Excavate landfill soil, inorganic hot spots in the former lagoon area, and inorganic hot spots in the scraped area for soil washing.

- Onsite treatment and disposal of soils from landfill and inorganic hot spots using soil washing techniques.

- Excavate lagoon area and scraped area, and dredge and dewater stream sediments.

- Onsite treatment of soils/sediments from lagoon area, scraped area, and streams using bioremediation techniques.

- Toxicity testing (bioassays) for streams 1, 2, and 3 before, during, and after remedial action.

- Deed restrictions to prevent future residential development.

Soil washing of the landfill and inorganic hot spots (approximately 29,575 cubic yards) would be conducted as described in Alternative 3. Bioremediation in this instance would involve biological degradation of polynuclear aromatic hydrocarbons (PAHs) in a treatment bed constructed within the area of contamination. The untreated soil would be combined in the treatment bed with nutrients and clean soil and rototilled periodically to aerate the mixture and accelerate the naturally occurring biodegradation process. Excavated areas will be backfilled and revegetated as the project proceeds. The treatment bed containing the remediated soil will remain intact and be revegetated after complete remediation. A treatability study will be conducted to determine design criteria for bioremediation.

Alternative 5A and 5B: Soil Washing (Landfill, Inorganic Hot Spots) and Onsite Incineration (5A) or Offsite Incineration (5B) of Sediments, Lagoon Area, and Scraped Area
5A: $28,590,000
5B: $44,167,000

- Excavate contaminated landfill soils and inorganic hot spots (425 cubic yards) from the lagoon area and scraped area. Soil wash excavated soils onsite and dispose of treated soils onsite.

- Excavate sediments, lagoon area, and scraped area and incinerate either onsite or transport to an offsite RCRA incineration facility for treatment.

- For option involving onsite incineration, test incinerator ash for EP toxicity and dispose of ash onsite in excavated areas if not hazardous, or offsite at a RCRA hazardous waste landfill following treatment if determined to be hazardous by EP toxicity testing.

- Deed restrictions to prevent future residential development.

- Toxicity testing (bioassays) for streams 1,2, and 3 before, during, and after remedial action.

The soil washing of the landfill and inorganic hot spots will be conducted as described in Alternative 3. Treated soil would be returned to original excavated areas after verification, by EP toxicity testing, that the treated soil is not hazardous. Offsite incineration can be accomplished by excavation and transportation of organic contaminated soils/sediments to an

offsite permitted RCRA hazardous incinerator facility. The excavation process would comply with RCRA requirements for the clean closure of landfills. The resulting ash would be properly disposed of by the RCRA facility. For onsite incineration, a mobile incinerator would be brought to the site. The ash would be used as backfill, following EP toxicity testing to verify that ash is not EP toxic. The excavation and backfilling process would comply with RCRA requirements for clean closure of landfills. Any ash determined to be a RCRA hazardous waste would require treatment and disposal in a RCRA hazardous waste facility.

Alternative 6: Capping (Landfill) and Soil Washing (Remaining Areas)
$9,393,000

- RCRA equivalent cap over existing landfill.
- Surface management for erosion and sediment control.
- Deed restrictions to prevent future development of the capped area, and residential development in other areas.
- Excavate contaminated soils (outside landfill) for soil washing.
- Onsite soil washing and disposal of treated soils and sediments for lagoon area, scraped area, and dredge and dewatered stream sediments.
- Monitoring program for groundwater, surface water, and sediments as described in Alternative 2.

Alternative 6 combines containment and treatment. It is similar to Alternative 3 except that the contents of the landfill would remain in place, and the landfill would be covered with a RCRA equivalent cap as described in Alternative 2. Soil washing would be conducted as described in Alternative 3 for the sediments, lagoon area, and scraped area (approximately 16,700 cubic yards). Treated soil would be returned to original excavated areas after verification, by EP toxicity testing, that the treated soil is not hazardous.

Alternative 7A and 7B: **Capping (Landfill), Onsite Incineration (7A) or Offsite Incineration (7B) of Lagoon Area, Sediments, and Scraped Area, and Solidification of Inorganic Hot Spots (Lagoon and Scraped Areas)**

7A: $21,221,000
7B: $37,562,000

- RCRA equivalent cap over existing landfill. Provide surface water management for erosion and sediment control.

- Excavate inorganic hot spots from lagoon area and scraped area and solidify onsite.

- Excavate sediments, lagoon area, and scraped area and incinerate either onsite or transport to an offsite RCRA incineration facility for treatment.

- For option involving onsite incineration, test incinerator ash for EP toxicity and dispose of ash onsite at a RCRA hazardous waste landfill if ash is determined to be hazardous by EP toxicity testing.

- Toxicity testing (bioassays) for streams 1, 2, and 3 before, during, and after remediation.

- Monitoring program for groundwater, surface water, and sediments.

Alternatives 7A and 7B employ the same incineration technology as alternatives 5A and 5B. Alternative 7 will consist of placing a RCRA equivalent cap over the landfill and solidification of inorganics excavated from the hot spots (425 cubic yards) using cement or fly ash methods. Solidification requires mixing excavated soils onsite with a fixation agent to form a solidified mass. The solidified soil will be placed in the existing landfill before capping, after testing to determine that the solidified soils do not exhibit hazardous waste characteristics. Alternately, soils may be transported offsite for disposal in an approved RCRA landfill. Deed restrictions would be necessary to prevent construction on the capped area and to prevent development of a residential area onsite.

Alternative 8A and 8B: **Landfill Capping, Bioremediation Atop the Landfill (8A) or in a Separate Treatment Bed (8B) and Solidification.**

8A: $8,058,000
8B: $8,332,000

- RCRA equivalent cap over existing landfill. Surface management for erosion and sediment control.
- Excavate inorganic hot spots from lagoon area and scraped area and solidify onsite.
- Excavate organic contaminants from the lagoon area, scraped area, and sediments and treat using onsite bioremediation in a treatment bed.
- Monitoring program for groundwater, surface water, and sediments.
- Deed restrictions to prevent future residential development and to prevent construction on the capped area.

This alternative will consist of installing a treatment bed to conduct the bioremediation of the organic contaminants present in the lagoon area, stream sediments, and the scraped area (13,460 cubic yards).

The treatment bed will be installed overlying the area of the existing landfill for Alternative 8A. This will allow the treatment bed to also act as a RCRA equivalent cap for the landfill. The solidification of the inorganic hot spots (425 cubic yards) would have to be conducted first and solidified waste placed in the landfill prior to capping. Alternative 8B will be the same as Alternative 8A, except that the bioremediation treatment bed will not be located over the landfill, although it will be placed within the associated area of contamination. A RCRA equivalent cap will be placed over the landfill. Bioremediation of the lagoon area, sediments, and organic hot spots from the scraped area will be conducted as described in Alternative 4. Solidification of the inorganic hot spots will be conducted as described in Alternative 7A/7B. Deed restrictions would be necessary to prevent construction on the capped area and to prevent development of a residential area on site.

IX. COMPARATIVE ANALYSIS OF ALTERNATIVES

The eight remedial action alternatives described above were evaluated using the following nine evaluation criteria presented in "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA, October 1988) and EPA Directive 9355,3-02, "Draft Guidance on Preparing Superfund Decision Documents: The Proposed Plan and Record of Decision." These nine criteria can be further categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria.

Threshold Criteria

-Overall protection of human health and the environment
-Compliance with applicable or relevant and appropriate requirements

Primary Balancing Criteria

-Reduction of toxicity, mobility, or volume
-Implementability
-Short-term effectiveness
-Long-term effectiveness
-Cost

Modifying Criteria

-Community acceptance
-State acceptance

These evaluation criteria relate directly to requirements in Section 121 of CERCLA which measure the overall feasibility and acceptability of the remedy. Threshold criteria must be safisfied in order for a remedy to be eligible for selection. Primary balancing criteria are used to weigh major trade-offs between remedies. State and community acceptance are modifying criteria formally taken into account after public comment is received on the Proposed Plan. The evaluations are as follows:

1) Protection of Human Health and the Environment

A primary requirement of CERCLA is that the selected remedial action be protective of human health and the environment. A remedy is protective if it reduces current and potential risks to acceptable levels posed by each exposure pathway at the site.

Soil Washing, Bioremediation, Incineration, Solidification

Remedies employing soil washing, bioremediation, and incineration of soils and sediments (Alternatives 3, 4, 5A and 5B) would provide the greatest degree of protection of human health and the environment because of the elimination of contaminants from these media. Both organic and inorganic contaminants would be permanently treated to risk-based cleanup levels. Public and environmental risks from direct soil contact and ingestion would be mitigated. Excavation and treatment activities may present short-term public health risks from dust and/or airborne volatile organic. These risks would be evaluated by air monitoring and addressed appropriately. To minimize long-term risks, deed restrictions will be necessary to prevent residential construction.

Combined Containment (Landfill Capping) and Treatment

Alternatives 6, 7, and 8, which use landfill capping in addition to a treatment technology as a component of the remedial action, also provide a high degree of protection. Migration of contaminants and direct exposure to soils and sediments would be mitigated. Both organic and inorganic contaminants outside the landfill area would be treated to risk-based cleanup levels as previously discussed. Deed restrictions will be required to prevent risk associated with future soil excavation and construction in the capped area and residential construction in remaining areas.

No Action and Containment - Alternative 1, the no action alternative, provides only minimal health protection and no environmental protection. No provisions would be made to treat wastes or to control offsite migration of soils and sediments, and wildlife may still have access to the site. Alternative 2 proposes capping all areas. This alternative would prevent potentially adverse exposure risks associated with current use by eliminating exposure routes such as sediment transport, dermal contact, ingestion of contaminated soils and sediments, and inhalation of dust and vapors.

2) Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA requires that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State standards, requirements, criteria, and limitations (which are collectively referred to as "ARARs"). Applicable requirements (requirements which must be satisfied unless one of CERCLA's waiver provisions is justified) are those substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address hazardous materials found at the site, the remedial action to be implemented at the site, the location of the site, or other circumstances at present at the site. Relevant and appropriate requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law which, while not applicable to the hazardous materials found at the site, the remedial action itself, the site location, or other circumstances at the site, nevertheless address problems or situations sufficiently similar to those encountered at the site that their use is well-suited to that site.

The ARARs and other non-promulgated advisories and guidances issued by Federal and State governments ("To-Be-Considered") or "TBCs") for the Preferred Remedial Action and Contingency Remedial Action are discussed below. Table 5 provides a list of potential ARARS and TBCs considered for each alternative reviewed.

Resource Conservation and Recovery Act ("RCRA")

RCRA regulates the generation, transportation, treatment, storage, and disposal of hazardous wastes. Hazardous substances, pollutants, and contaminants found at CERCLA sites are hazardous wastes potentially triggering RCRA requirements only if they are RCRA-listed wastes (40 C.F.R. Part 261, Subpart D) or if such substances exhibit certain physical characteristics (40 C.F.R. Part 261, Subpart C). EPA has determined that the contaminated soils and sediments found at Operable Unit No. 1 of the Ordnance Works site are neither RCRA-listed wastes nor characteristic wastes and that, as a result, RCRA requirements are not legally applicable. Portions of RCRA may nevertheless be relevant and appropriate and are further discussed below.

RCRA Subtitle C Closure Requirements

Excavation, consolidation, and other similar actions that move RCRA hazardous wastes so as to constitute disposal of such wastes will trigger closure requirements for the unit into which

the wastes are placed. RCRA closure requirements may be satisfied by implementing clean closure (under which all hazardous wastes and residues and contaminated system components, soils, structures, and equipment are removed or decontaminated) or disposal or landfill closure (under which hazardous wastes are covered with a RCRA cap and the site subjected to post-closure care and maintenance). Under several alternatives considered for implementation at Operable Unit No. 1, contaminants exceeding risk-based cleanup levels established in this ROD will remain onsite. EPA has reviewed records supplied by companies that operated at the site and found no evidence that RCRA listed hazardous waste was disposed at Operable Unit No. 1. In addition, the hazardous constitutents and concentrations detected at Operable Unit No. 1 are not indicative of the levels found in RCRA hazardous waste. Therefore, EPA has determined that such contaminants are not RCRA hazardous wastes and that, as a result, RCRA requirements are not legally applicable. EPA nevertheless concludes that the RCRA closure requirements are relevant and appropriate to the former landfill because wastes that are generally similar to listed wastes (and which may have been generated from manufacturing operations at the site) will (under Alternatives 1, 2, 6, 7, and 8) remain at this location in concentrations above the cleanup levels established in this ROD. Accordingly, a RCRA-type cap will be used for the landfill for such alternatives. Groundwater monitoring is not expected to be extensive, however, as groundwater is not a primary contaminant migration pathway. Deed restrictions preventing residential development will also be employed since areas outside the landfill will neither be completely decontaminated (though they will be remediated to within the selected cleanup levels established for an industrial-use scenario) nor capped.

Land Disposal Restrictions

The 1984 amendments to RCRA establish schedules for promulgation of regulations restricting land disposal of hazardous wastes. The statute and land disposal restrictions promulgated thereunder are not applicable in this instance because none of the contaminants found at Operable Unit No. 1 are RCRA hazardous wastes. If, after treatment, the waste exhibits hazardous characteristics, the residuals will be managed in accordance with hazardous waste requirements under Subtitle C of RCRA. Treatment standards for characteristic waste will be established in May 1990. If treatment standards can not be met, a treatability variance will be considered.

Clean Water Act

The Clean Water Act requires a National Pollutant Discharge Elimination System (NPDES) permit for any discharge from a point source to navigable waters of the United States. The Clean Water Act also requires that any discharge to a publically owned

treatment works (POTW) meet Federal pretreatment standards. The West Virginia Department of Natural Resources has adopted water quality regulations for the Monongahela River.

None of the alternatives evaluated in this ROD involve discharges to the Monongahela River, and, accordingly, Clean Water Act NPDES regulations and West Virginia water quality regulations are not ARARs. Alternatives 3,4,5A/5B, and 6 (involving soil washing) would generate a wastewater stream that would be treated onsite. The treated water would be used for dust control, and any excess treated wastewater would be discharged to the Morgantown Municipal treatment plant via the sanitary sewer at the Ordnance Works site. Any excess water generated from the bioremediation process (Alternatives 8A and 8B) would also be discharged to the Morgantown Municipal plant. Federal pretreatment requirements governing such discharges must, under such circumstances, be satisfied.

Clean Air Act
West Virginia Air Pollution Control Regulations

The Federal Clean Air Act and West Virginia Air Pollution Control Regulations identify and regulate pollutants that could possibly be released during the course of remediation. For alternatives involving excavation of soils and sediments (Alternatives 3,4,5A/5B,6,7A/7B, and 8A/8B, air monitoring will be required to ensure compliance with Federal and state air emission regulations.

Occupational Safety and Health Administration Act (OSHA)

During remedial action a health and safety program for onsite workers will be implemented to comply with OSHA requirements.

Criteria for Offsite Disposal

Alternatives involving soil washing will generate a concentrated liquid organic residue waste to be disposed of by offsite incineration. Offsite disposal will be performed in accordance with the requirements of EPA's Offsite Policy, which prohibits the use of a facility that has significant outstanding Class I violations under RCRA. All vehicles used for transportation from the site will be properly labeled in accordance with Department of Transportation (DOT) regulations and decontaminated before leaving the site to prevent residual contaminants from being transported offsite.

Protection of Wetlands

Executive Order 11990, Protection of Wetlands (40 CFR Part 6, Appendix A) requires Federal agencies conducting remedial

activities to minimize adverse impacts to wetlands. No wetlands have been identified along stream banks on the site. Any wetlands identified onsite in other areas will be restored to existing conditions.

Criteria, Advisories, or Guidance To Be Considered

Risk-based cleanup levels in Table 4 in this ROD were developed using the following advisory levels and guidelines that are "to be considered" (TBC):

-EPA-established action level of 500 mg/kg for lead.

-EPA-established Reference Doses (RfDs) used to develop risk-based cleanup levels for cadmium and copper.

-EPA-Carcinogenic Potency Factors to develop risk-based cleanup levels for arsenic and CPAHs.

TABLE 5

DOCUMENTATION OF ARARs
MORGANTOWN ORDNANCE WORKS SITE
MORGANTOWN, WEST VIRGINIA

	CONTAMINANT-SPECIFIC					
	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5A	Alternative 5B
	No Action	Capping	Soil Washing	Soil Washing and Biodegradation	Soil Washing and Onsite Incineration	Soil Washing and Offsite Incineration
Clean Water Act (PL92-500) Federal Ambient Water Quality Criteria (AWQC) and West Virginia Water Quality Standards (West Virginia Code, Chapter 20, Article 5A)	Will not meet. Migration of contaminated stream sediments to the Monongahela River could impact aquatic life.	Can comply.	Can comply	Can comply	Can comply	Can comply
EPA Advisory Levels establishes an action level of 500 mg/kg for lead, based on Centers for Disease Control (CDC) blood-lead levels, now regional policy (TBC)	Will not meet (TBC). No waiver is justified	Prevention of migration provided by capping contaminated areas	Can meet (TBC)	Can meet (TBC)	Can meet (TBC)	Can meet (TBC)
West Virginia Ambient Air Quality Standards West Virginia Code Chapter 16, Article 20	NA	NA	Can meet	Can meet	Can meet	Can meet
West Virginia Ambient Air Quality Standards West Virginia Code Chapter 16, Article 20	NA	NA	Can meet	Can meet	Can meet	Can meet
Reference Doses (RfDs), EPA Office of Research and Development, and Carcinogenic Potency Factors, EPA Environmental Criteria and Assessment Office, EPA Carcinogen Assessment Group. Used to develop risk-based action levels for Morgantown Ordnance Works Site Arsenic - 88.8 mg/kg CPAHs - 44.7 mg/kg Cadmium - 642 mg/kg Chromium - 11,100 mg/kg Copper - 41,100 mg/kg Mercury - 332 mg/kg Zinc - 234,000 mg/kg (TBC)	Will not meet (TBC). No waiver is justified	Prevention of migration provided by capping contaminated areas	Can meet (TBC)	Can meet (TBC)	Can meet (TBC)	Can meet (TBC)

	CONTAMINANT-SPECIFIC				
	Alternative 6	Alternative 7A	Alternative 7B	Alternative 8A	Alternative 8B
	Capping and Soil Washing	Capping, Onsite Incineration, and Solidification	Capping, Offsite Incineration, and Solidification	Capping, Biodegradation, and Solidification	Capping, Biodegradation, and Solidification
Clean Water Act (PL92-500) Federal Ambient Water Quality Criteria (AWQC) and West Virginia Water Quality Standards (West Virginia Code, Chapter 20, Article 5A)	Can comply.	Can comply	Can comply	Can comply	Can comply
EPA Advisory Levels establishes an action level of 500 mg/kg for lead, based on Centers for Disease Control (CDC) blood-lead levels, now regional policy (TBC)	Can meet for lagoon area, scraped area and stream sediments. Will not meet for landfill (TBC). Prevention of migration provided by capping of landfill	Can meet for lagoon area, scraped area and stream sediments. Will not meet for landfill (TBC). Prevention of migration provided by capping of landfill	Can meet for lagoon area, scraped area and stream sediments. Will not meet for landfill (TBC). Prevention of migration provided by capping of landfill	Can meet for lagoon area, scraped area and stream sediments. Will not meet for landfill (TBC). Prevention of migration provided by capping of landfill	Can meet for lagoon area, scraped area and stream sediments. Will not meet for landfill (TBC). Prevention of migration provided by capping of landfill
West Virginia Ambient Air Quality Standards West Virginia Code Chapter 16, Article 20	Can meet	Can meet	Can meet	Can meet	Can meet
West Virginia Ambient Air Quality Standards West Virginia Code Chapter 16, Article 20	Can meet	Can meet	Can meet	Can meet	Can meet
Reference Doses (RfDs), EPA Office of Research and Development; and Carcinogenic Potency Factors, EPA Environmental Criteria and Assessment Office, EPA Carcinogen Assessment Group. Used to develop risk-based action levels for Morgantown Ordnance Works Site Arsenic - 88.8 mg/kg CPAHs - 44.7 mg/kg Cadmium - 642 mg/kg Chromium - 11,100 mg/kg Copper - 41,100 mg/kg Mercury - 332 mg/kg Zinc - 234,000 mg/kg (TBC)	Can meet for lagoon area, scraped area and stream sediments. Will not meet for landfill (TBC). Prevention of migration provided by capping of landfill	Can meet for lagoon area, scraped area and stream sediments. Will not meet for landfill (TBC). Prevention of migration provided by capping of landfill	Can meet for lagoon area, scraped area and stream sediments. Will not meet for landfill (TBC). Prevention of migration provided by capping of landfill	Can meet for lagoon area, scraped area and stream sediments. Will not meet for landfill (TBC). Prevention of migration provided by capping of landfill	Can meet for lagoon area, scraped area and stream sediments. Will not meet for landfill (TBC). Prevention of migration provided by capping of landfill

	LOCATION-SPECIFIC					
	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5A	Alternative 5B
	No Action	Capping	Soil Washing	Soil Washing and Biodegradation	Soil Washing and Onsite Incineration	Soil Washing and Offsite Incineration
Executive Order 11990 (Wetlands Management) Evaluate potential effects of actions, avoid adverse impacts to the extent possible and Regulation of Activities Affecting Water of the U S (33 CFR, Parts 320-329) U S Army Corps of Engineers Regulations are applicable to wetlands	Will not meet Migration of contaminated stream sediments will adversely impact wetlands	Can meet Must avoid adverse effects, minimize potential harm, and preserve and enhance wetlands to the extent possible	Can meet Must avoid adverse effects, minimize potential harm, and preserve and enhance wetlands to the extent possible	Can meet Must avoid adverse effects, minimize potential harm, and preserve and enhance wetlands to the extent possible	Can meet Must avoid adverse effects, minimize potential harm, and preserve and enhance wetlands to the extent possible	Can meet Must avoid adverse effects, minimize potential harm, and preserve and enhance wetlands to the extent possible
Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230) and Dredged Material Disposal Sites Removal or Restriction Procedures (404c), 40 CFR, Part 231 (33 CFR 320 330)	NA	Can meet Consultation with the Corps is required	Can meet Consultation with the Corps is required	Can meet Consultation with the Corps is required	Can meet Consultation with the Corps is required	Can meet Consultation with the Corps is required

	LOCATION-SPECIFIC				
	Alternative 6	Alternative 7A	Alternative 7B	Alternative 8A	Alternative 8B
	Capping and Soil Washing	Capping, Onsite Incineration, and Solidification	Capping, Offsite Incineration, and Solidification	Capping, Biodegradation, and Solidification	Capping, Biodegradation, and Solidification
Executive Order 11990 (Wetlands Management) Evaluate potential effects of actions, avoid adverse impacts to the extent possible and Regulation of Activities Affecting Water of the U S (33 CFR, Parts 320-329) , U S Army Corps of Engineers Regulations are applicable to wetlands	Can meet Must avoid adverse effects, minimize potential harm, and preserve and enhance wetlands to the extent possible	Can meet Must avoid adverse effects, minimize potential harm, and preserve and enhance wetlands to the extent possible	Can meet Must avoid adverse effects, minimize potential harm, and preserve and enhance wetlands to the extent possible	Can meet Must avoid adverse effects, minimize potential harm, and preserve and enhance wetlands to the extent possible	Can meet Must avoid adverse effects, minimize potential harm, and preserve and enhance wetlands to the extent possible
Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230) and Dredged Material Disposal Sites Removal or Restriction Procedures (404c), 40 CFR, Part 231 (33 CFR 320-330)	Can meet Consultation with the Corps is required	Can meet Consultation with the Corps is required	Can meet Consultation with the Corps is required	Can meet Consultation with the Corps is required	Can meet Consultation with the Corps is required

DOCUMENTATION OF ARARs
MORGANTOWN ORDNANCE WORKS SITE
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	ACTION SPECIFIC					
	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5A	Alternative 5B
	No Action	Capping	Soil Washing	Soil Washing and Biodegradation	Soil Washing and Onsite Incineration	Soil Washing and Offsite Incineration
Resource Conservation and Recovery Act (RCRA) as amended by Hazardous and Solid Waste Amendments (HSWA) 42 USCA 7401-7642)						
• Closure						
- Closure with waste in place (capping)	Will not meet No action taken to meet ARAR	Can meet	NA	NA	NA	NA
- Closure of Land Treatment Units (40 CFR 264 280)	NA	NA	NA	Can meet	NA	NA
• Incineration (40 CFR 264 340-345)	NA	NA	NA	NA	Performance standards can be met by onsite incinerator	NA
• Solid Waste Disposal (40 CFR 241 200-212)	NA	NA	NA	NA	NA	NA

DOCUMENTATION OF ARARs
MORGANTOWN ORDNANCE WORKS SITE
MORGANTOWN, WEST VIRGINIA

	ACTION SPECIFIC				
	Alternative 6	**Alternative 7A**	**Alternative 7B**	**Alternative 8A**	**Alternative 8B**
	Capping and Soil Washing	**Capping, Onsite Incineration, and Solidification**	**Capping, Offsite Incineration, and Solidification**	**Capping, Biodegradation, and Solidification**	**Capping, Biodegradation, and Solidification**
Resource Conservation and Recovery Act (RCRA) as amended by Hazardous and Solid Waste Amendments (HSWA) 42 USCA 7401-7642)					
• Closure					
- Closure with waste in place (capping)	Can meet for landfill	Can meet for landfill	Can meet for landfill	Can meet for landfill	Can meet for landfill
Closure of Land Treatment Units (40 CFR 264 280)	NA	NA	NA	Can meet	Can meet
• Incineration (40 CFR 264 340-345)	NA	Performance standards can be met by onsite incinerator	NA	NA	NA
• Solid Waste Disposal (40 CFR 241 200-212)	NA	Can meet Inorganic hot spots will be fixated and disposed of in onsite landfill, prior to capping	Can meet Inorganic hot spots will be fixated and disposed of in onsite landfill, prior to capping	Can meet Inorganic hot spots will be fixated and disposed of in onsite landfill, prior to capping	Can meet Inorganic hot spots will be fixated and disposed of in onsite landfill, prior to capping

DOCUMENTATION OF ARARs
MORGANTOWN ORDNANCE WORKS SITE
MORGANTOWN, WEST VIRGINIA

	ACTION-SPECIFIC					
	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5A	Alternative 5B
	No Action	Capping	Soil Washing	Soil Washing and Biodegradation	Soil Washing and Onsite Incineration	Soil Washing and Offsite Incineration
Clean Water Act Requirements • General Pretreatment Regulations for Existing and New Sources of Pollutants (40 CFR 403.5 and local POTW regulations) Indirect discharge to POTW	NA	NA	Can meet Effluent can meet all substantive and administrative requirements, including local discharge limitations and prohibitions	Can meet Effluent can meet all substantive and administrative requirements, including local discharge limitations and prohibitions	Can meet Effluent can meet all substantive and administrative requirements, including local discharge limitations and prohibitions	Can meet Effluent can meet all substantive and administrative requirements, including local discharge limitations and prohibitions
OSHA Requirements (29 CFR, Parts 1910, 1926, and 1904) Required for workers during onsite activities	Can meet	Can meet	Can meet	Can meet	Can meet	Can meet
Threshold Limit Values, American Conference of Governmental Industrial Hygienists	Can meet	Can meet	Can meet	Can meet	Can meet	Can meet
DOT Rules for Hazardous Materials Transport (49 CFR, Parts 107, 171 1-500) Offsite treatment and disposal	NA	NA	Can meet for offsite transport of soil washing residue	Can meet for offsite transport of soil washing residue	Can meet for offsite transport of soil washing residue	Can meet for offsite transport of soil washing residue and soils to be incinerated
West Virginia Air Pollution Control Law, West Virginia Code Chapter 16, Article 20 and West Virginia Air Pollution Control Regulations, West Virginia Code Chapter 16, Article 20	NA	NA	Can meet during excavation activities	Can meet during excavation activities	Can meet during excavation activities and for incinerator emissions	Can meet during excavation activities

DOCUMENTATION OF ARARs
MORGANTOWN ORDNANCE WORKS SITE
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	ACTION SPECIFIC				
	Alternative 6	Alternative 7A	Alternative 7B	Alternative 8A	Alternative 8B
	Capping and Soil Washing	Capping, Onsite Incineration, and Solidification	Capping, Offsite Incineration, and Solidification	Capping, Biodegradation, and Solidification	Capping, Biodegradation, and Solidification
Clean Water Act Requirements • General Pretreatment Regulations for Existing and New Sources of Pollutants (40 CFR 403 5 and local POTW regulations) Indirect discharge to POTW	Can meet Effluent can meet all substantive and administrative requirements, including local discharge limitations and prohibitions.	Can meet Effluent can meet all substantive and administrative requirements, including local discharge limitations and prohibitions.	NA	Can meet Effluent can meet all substantive and administrative requirements, including local discharge limitations and prohibitions	Can meet Effluent can meet all substantive and administrative requirements, including local discharge limitations and prohibitions
OSHA Requirements (29 CFR, Parts 1910, 1926, and 1904) Required for workers during onsite activities	Can meet.	Can meet	Can meet	Can meet	Can meet
Threshold Limit Values, American Conference of Governmental Industrial Hygienists	Can meet	Can meet.	Can meet	Can meet	Can meet
DOT Rules for Hazardous Materials Transport (49 CFR, Parts 107, 171 1-500) Offsite treatment and disposal	Can meet for offsite transport of soil washing residue	NA	Can meet for offsite transport of soil to be incinerated	NA	NA
West Virginia Air Pollution Control Law, West Virginia Code Chapter 16, Article 20 and West Virginia Air Pollution Control Regulations, West Virginia Code Chapter 16, Article 20	Can meet during excavation activities.	Can meet during excavation activities and for incinerator emissions.	Can meet during excavation activities	Can meet during excavation activities	Can meet during excavation activities

3) Reduction of Toxicity, Mobility, or Volume

This evaluation criteria addresses the degree to which a technology or remedial alternative reduces toxicity, mobility, or volume of hazardous substance. Section 121(b) of CERCLA establishes a preference for remedial actions that permanently and significantly reduce the toxicity, mobility, or volume of hazardous contaminants over remedial actions which will not result in such reductions.

Soil Washing, Bioremediation, Incineration, Solidification

Incineration and soil washing (Alternatives 5A and 5B) provide the greatest degree of permanent reduction of toxicity and mobility of contaminated soil and sediments. Incineration will achieve greater than 99 percent reduction of contaminant levels; soil washing will achieve 95 percent reduction of organic contaminants, and the inorganics will be removed as soluble constituents. Bioremediation is expected to reduce organic contaminants in soils and sediments 65 to 95 per cent each year that the bioremediation process is operated. Solidification of inorganic hot spots would completely immobilize the waste as a solid cement product.

Combined Containment (Landfill Capping) and Treatment

The combined containment/treatment remedies which propose both capping and treatment technologies (Alternatives 6, 7A,7B, and 8) reduce mobility but provide less reduction of toxicity than those alternatives featuring treatment alone. These containment/treatment alternatives satisfy the CERCLA preference for use of a permanent remedy since treatment will be a principal element of the remedies and will be applied to remediate those portions of the operable unit (lagoon area and scraped area) with highest concentrations of CPAHs and inorganic metals.

No action and Containment

Both the no action alternative (Alternative 1) and in-place containment by capping (Alternative 2) are remedial actions that do not use treatment technologies. The toxicity, mobility, and volume of the contaminants would not be reduced since the physical, chemical, or biological characteristics of the waste is not altered through treatment.

4) Implementability

Implementability refers to the technical and administrative feasibility of a remedy, from design through construction, operation, and maintenance.

Soil Washing, Bioremediation, Incineration, Solidification

Implementation of any of these treatment technologies is not expected to present any major problems in terms of equipment, skilled labor, or operation and maintenance. All are feasible technologies. The availability of treatment, storage, and disposal services is not expected to hinder implementation of any of those technologies. Because of the large quantity of debris within the landfill, permanent treatment of the contents of the landfill would be difficult to implement and is not considered feasible for this site. These concerns would make implementation of Alternatives 3, 4, 5A, and 5B non-feasible.

Bioremediation is the easiest technology to implement. The equipment used to rototill the soils is commercially available farm equipment, and specialists will not be required to operate the system on a continuous basis. The treatment bed can be constructed within the Operable Unit and no offsite disposal services are required. Bioremediation has been demonstrated in laboratory and field pilot scale operations and has been proposed for at least a dozen other Superfund sites contaminated with wastes similar to those found at the Ordnance Works. Treatability studies will be necessary to establish final design requirements. The time required to complete bioremediation would be at least three years longer than other treatment technologies and is dependent on the rate at which bioremediation occurs.

Soil washing is also considered feasible to implement and is based on a treatment process used successfully for many years in the chemical manufacturing industry. Soil washing in this instance would utilize a commercially available proprietary solvent extraction process which would require the assistance of specialists provided by the vendor. At least one known commercial soil washing process cannot handle solids greater than one-inch in size, requiring that contaminated soils be screened to segregate larger particles. The expected small quantity of screened material would be disposed offsite at a RCRA landfill (assuming the waste is not EP toxic). Treatability studies will be necessary to establish final design requirements. Soil washing has been implemented and effectively operated at the General Refining Superfund site in Garden City, Georgia.

Incineration is a relatively complex technology but has been successfully implemented at other Superfund sites. Both onsite and offsite incineration capacity is adequate to treat the volume of soils at Ordnance Works. Offsite incineration would require

transportation to an out-of-state incineration facility. The effect of incineration on catalyst pellets found throughout the site are unknown. The pellets do not presently leach heavy metals, but post-incineration testing would be required to determine if the ash exhibited hazardous characteristics. A trial burn to determine if treatment standards under RCRA would be met would also be required before the remedy is implemented.

Capping

The technologies proposed for capping, excavation, grading, and surface-water diversion are all well-demonstrated. Long-term site monitoring is proposed, and deed restrictions preventing future construction on top of the capped area would be required. Maintaining a multi-media cap is not anticipated to be a major concern. Landfill capping and any of the permanent treatment technologies may be implemented simultaneously, but inorganic hot spots must be solidified and placed in the landfill before it is capped as described in Alternative 8A and 8B.

5) Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to achieve protection of human health and the environment and any adverse impacts that may be posed during the construction and operation period until cleanup goals are achieved.

The no action alternative (Alternative 1) can be implemented in the shortest period of time since no construction activities are required, but provides no protection of the environment. Alternatives involving excavation and subsequent management of contaminated soils through treatment would present the greatest opportunity for exposure to contaminants by onsite workers. Protective measures including use of protective clothing for site workers, dust control, and air monitoring will minimize the impact to site workers and the surrounding community.

Soil Washing, Bioremediation, Incinerator, Solidification

Alternatives 3, 5B, 6, and 7B will require approximately 2.5 years to complete. Alternatives 5A and 7A will be completed in 2.5 to 3.5 years (additional time is required for an incinerator test burn). Alternatives 4 and 8, involving bioremediation, will take at least 5.5 years to implement. These time frames include predesign, design, and construction activities.

Alternatives involving soil washing of the landfill (Alternatives 3, 4, 5A and 5B) will require greater time to implement because of large quantities of debris and metal buried in the landfill that must be removed and screened before soil washing.

Bioremediation (Alternatives 4, 8A and 8B) implementation time is largely impacted by the time required to biodegrade the polynuclear aromatic hydrocarbons (PAHs). It will take about 4 years if the initial concentration is 4000 mg/kg and only 1 year if the initial concentration is 500 mg/kg. A CPAH concentration of 500 mg/kg or less is typical of that found at the Ordnance Works. During the implementation period the treated soil would be kept wet (minimizing dust), workers would wear Level C protective clothing, and perimeter air monitoring would be used to measure air emission. A lined treatment bed would minimize migration of contaminants during implementation.

Alternatives 5A and 7A, involving onsite incineration, provide the potential for the greatest risk of air pollution through incinerator stack emissions. However, this concern is expected to be mitigated effectively by typical air pollution equipment. All alternatives that require offsite transport of contaminated material (Alternatives 3, 4, 5A, 5B, 6, and 7B) also pose the potential for adverse exposure to the community. This concern is also expected to be mitigated, barring any unusual circumstances, by normal operating procedures that are applied to the transport of hazardous material.

Landfill Capping

Capping of the landfill or other contaminated areas of the site will be reliable in the short-term and construction should be completed within three months. As with the other alternatives, workers will wear Level C protective equipment and perimeter air monitoring will be employed during excavation and construction activities.

6) Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence addresses the long-term protection of human health and the environment once cleanup goals have been achieved, and focuses on residual risk that will remain after completion of the remedial action.

No Action and Containment

Alternative 1 (no action) does not provide long-term effectiveness and permanence as contaminants will neither be eliminated through treatment nor contained in any fashion. Implementation of this alternative, without more, may eventually allow ground water to become contaminated. No protection of human health and the environment will be provided with this remedy. Alternative 2, in-place containment using a cap for the entire site, provides a low degree of long-term effectiveness, permanence, and risk reduction since wastes will be contained.

Frequent inspection and maintenance of the cap would be required, including mowing and repair. Long-term ground water monitoring would be necessary to verify that ground water is not contaminated by wastes left in place. Deed restrictions would be necessary to prevent disturbance of the cap.

Soil Washing, Bioremediation, Incineration, and Solidification

Alternatives 3, 4, and 5B provide the greatest degree of long-term effectiveness as contaminants are eliminated and long-term operation and maintenance is minimized. While Alternative 5A (onsite incineration and disposal) may also provide a high degree of long-term effectiveness, the effects of incineration on the catalyst pellets located throughout the operable unit will have to be determined.

Alternatives 6,7A,7B and 8 will permanently reduce the toxicity of contaminated soils/sediments left onsite to risk-based cleanup levels. Contaminated soils associated with the landfill will remain onsite, however, and will require long-term monitoring and maintenance. These alternatives can provide a long-term effectiveness and minimize future exposure to contaminants if deed restrictions are implemented and enforced.

7) Cost

CERCLA requires selection of a cost-effective remedy (not merely the lowest cost) that protects human health and the environment and meets other requirements of the statute. Project cost includes all construction and operation and maintenance costs incurred over the life of the project. An analysis of the present worth value of these costs has been completed for each alternative described in this Record of Decision, and is summarized in Table 6. Capital costs include those expenditures necessary to implement a remedial action. Annual operating costs are included in the present worth cost.

The costs of the eight alternatives range from 3.0 million to 44.1 million dollars. The degree of protection provided by the alternatives also varies. Comparison of different levels of costs for different levels of protectiveness and permanence of treatment is a primary decision criteria in the cost-effectiveness evaluation.

Alternatives 1 and 2, although lowest in cost, are less protective and do not provide permanent treatment as do other alternatives, and are therefore not considered cost effective. Alternatives 6 and 8 are next lowest in cost, at 9.3 million and 8.3 million dollars respectively, and provide 95 percent removal of contaminants treated. The remaining alternatives would increase cost by at least 100 percent with only marginal

TABLE 6

Summary of Remedial Action Alternatives Cost and Implementation Times

Remedial Action Alternative (Implementation Time)	Capital Costs, $	O&M Cost, $	Present Worth Cost,$
1- No Action (3 months)	144,000	185,600	3,053,000
2-Capping (1.3 years)	3,230,000	92,800	4,713,000
3-Soil Washing (2.6 Years)	17,308,000	-0-	17,308,000
4-Soil Washing & Bioremediation (5.3 to 10.3 years)	16,124,000	-0-	16,124,000
5A-Soil Washing & Onsite Incineration (3.5 years)	28,590,000	-0-	28,590,000
5B-Soil Washing & Offsite Incineration (3 years)	44,167,000	-0-	44,167,000
6-Soil Washing & Landfill Capping (2.5 years)	7,982,000	88,200	9,393,000
7A-Onsite Incineration & Landfill Capping (2.75 years)	19,810,000	88,200	21,221,000
7B-Offsite Incineration & Landfill Capping (2 years)	36,155,000	88,200	37,562,000
8A-Bioremediation and Landfill Capping (4.5 to 9.5 years)	6,686,000	88,200	8,058,000
8B-Bioremediation and Landfill Capping (4.75 to 9.75 years)	6,960,000	88,200	8,332,000

increases in the level of protection provided. Alternatives involving incineration, for example, range in cost from 21.2 million to 44.1 million dollars. Considering the cost and relatively high degree of protectiveness compared with other alternatives. Alternatives 6 and 8 are are considered to be the most cost-effective.

8) Community Acceptance

A public meeting on the proposed plan was held July 12, 1989 in Morgantown, West Virginia. Comments received from the public at that meeting are referenced in the Responsiveness Summary attached to this Record of Decision.

9) State Acceptance

The State of West Virginia has concurred with the selection of the Preferred Remedial Action and Contingency Remedial Action.

X. THE SELECTED REMEDY

EPA has selected, and the State of West Virginia has concurred in the selection of, a Preferred Remedial Action and Contingency Remedial Action for implementation at Operable Unit No. 1 of the Ordnance Works Disposal Areas site. Both remedies are protective of human health and the environment, are cost-effective, can meet or exceed ARARs, and utilize treatment technologies to the maximum extent practicable. The preferred and contingency remedies are summarized as follows:

Preferred Remedial Action--Alternative 8B--Soils and sediments with organic contaminants from the lagoon area, scraped area, and streams will be excavated and treated via bioremediation; inorganic hot spots will be excavated and the soils solidified and consolidated into the landfill; the landfill will be capped.

Contingency Remedial Action--Alternative 6--Soils and sediments from the lagoon area, scraped area, and streams will be excavated and treated via soil washing; the landfill will be capped.

EPA has selected Alternative 8B over Alternative 6 as the Preferred Remedial Action because Alternative 8B is more cost-effective than Alternative 6. While EPA has determined that both alternatives are, in theory, comparable in remediating contamination at Operable Unit No. 1 and in reducing risks associated with exposure to such contamination, the Agency recognizes that there are circumstances under which, in practice, Alternative 6 might provide a better balance among the nine Superfund remedy selection criteria. Accordingly, EPA has

selected 6 as a Contingency Remedial Action to be implemented at Operable Unit No. 1 under the following circumstances:

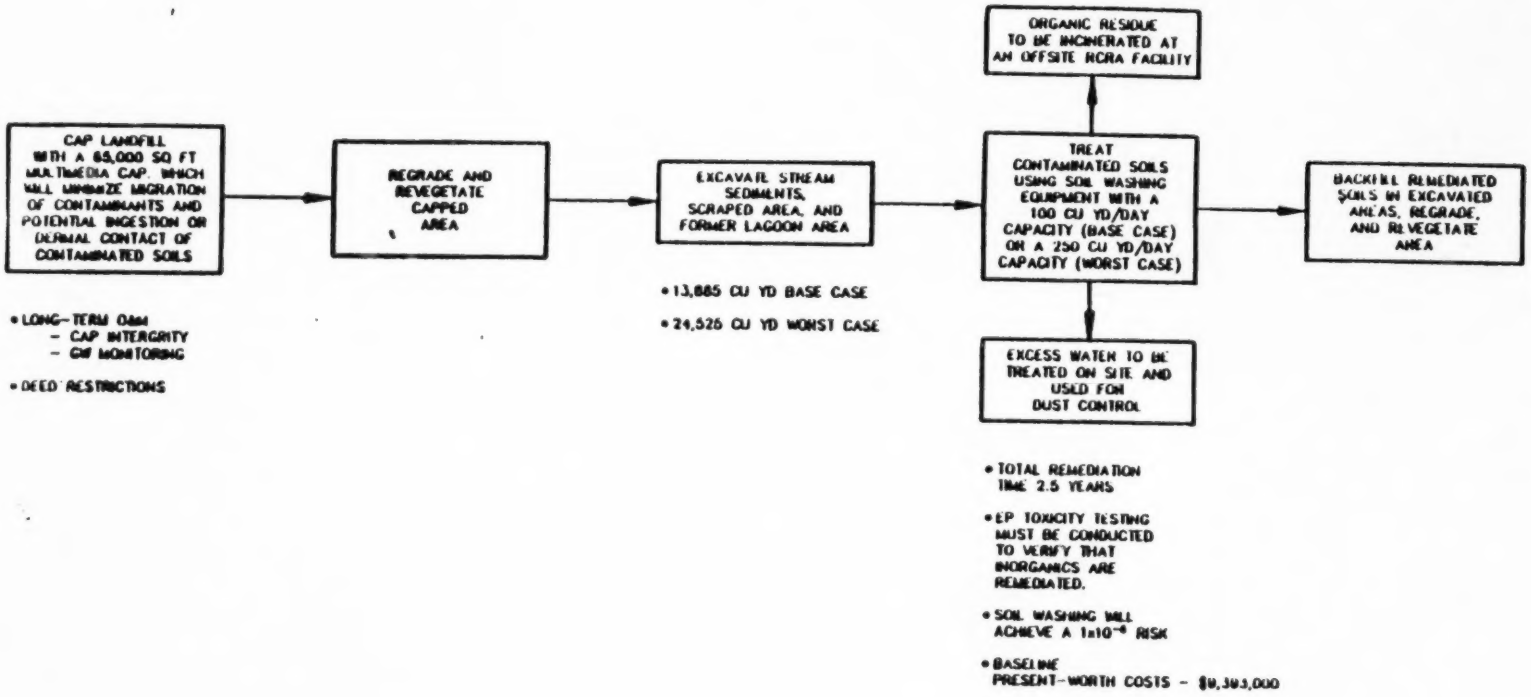
1) Design studies show that treatment levels in the ROD can not be achieved within a reasonable time frame (such as approximately five years or less); or

2) Responsible parties elect to design, implement, and finance Alternative 6 at Operable Unit No. 1; or

3) Information received during the bidding process suggests that the costs of implementing Alternative 8B are significantly higher than originally estimated (such as approximately 50 percent or greater).

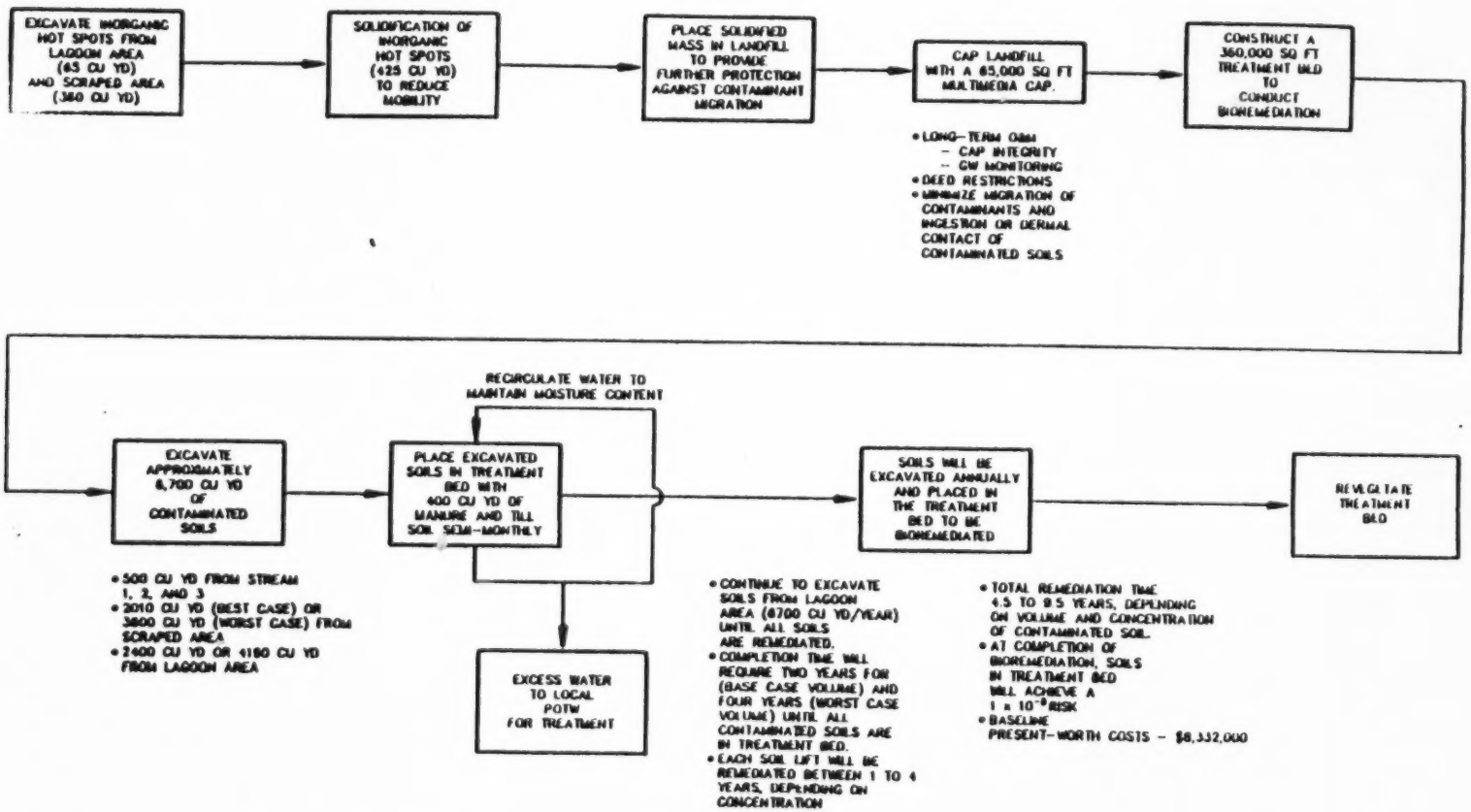
The remediation goals are to (1) contain wastes in the landfill area by construction of a RCRA-type cap over the landfill that will reduce the threat of migration of contaminants, and (2) provide treatment of contaminated soils and sediments in the scraped area, former lagoon area, and streams (drainage ditches) that transect the study area. Cleanup goals for carcinogens (CPAHs and arsenic) are based on a 1 x 10-6 cancer risk level for a future exposure scenario of construction workers at the site following remediation. In addition, because Alternative 6 uses soil washing and Alternative 8B uses bioremediation to eliminate the principal threat at the site, each remedy satisfies CERCLA's preference for remedies which utilize treatment as their principal element to reduce toxicity, mobility, or volume.

The flow charts in Figures 2 and 3 provide an illustration of the details of each remedy. Both the Preferred Remedial Action and the Contingency Remedial Action contemplate construction of a multi-media RCRA-type cap on the landfill. The cap will be approximately 65,000 square feet in size and will be designed to eliminate contaminant migration and will minimize risks associated with ingestion and dermal contact with landfill soils. Deed restrictions will be necessary to prevent future development of the landfill area. EPA has concluded that treatment of soils within the landfill using incineration, soil washing, or bioremediation techniques is impractical because of the presence of large amounts of metal and debris which would have to be screened and removed from those soils prior to treatment.


CAP LANDFILL WITH A 65,000 SQ FT MULTIMEDIA CAP, WHICH WILL MINIMIZE MIGRATION OF CONTAMINANTS AND POTENTIAL INGESTION OR DERMAL CONTACT OF CONTAMINATED SOILS
• LONG-TERM O&M
- CAP INTEGRITY
- GW MONITORING
• DEED RESTRICTIONS
REGRADE AND REVEGETATE CAPPED AREA
EXCAVATE STREAM SEDIMENTS, SCRAPED AREA, AND FORMER LAGOON AREA
• 13,885 CU YD BASE CASE
• 24,525 CU YD WORST CASE
ORGANIC RESIDUE TO BE INCINERATED AT AN OFFSITE RCRA FACILITY
TREAT CONTAMINATED SOILS USING SOIL WASHING EQUIPMENT WITH A 100 CU YD/DAY CAPACITY (BASE CASE) OR A 250 CU YD/DAY CAPACITY (WORST CASE)
EXCESS WATER TO BE TREATED ON SITE AND USED FOR DUST CONTROL
• TOTAL REMEDIATION TIME 2.5 YEARS
• EP TOXICITY TESTING MUST BE CONDUCTED TO VERIFY THAT INORGANICS ARE REMEDIATED.
• SOIL WASHING WILL ACHIEVE A 1x10⁻⁴ RISK
• BASELINE PRESENT-WORTH COSTS - $8,303,000
BACKFILL REMEDIATED SOILS IN EXCAVATED AREAS, REGRADE, AND REVEGETATE AREA

ALTERNATIVE NUMBER 6
CAPPING (LANDFILL) AND SOIL WASHING (REMAINING AREAS)
MORGANTOWN ORDNANCE WORKS SITE, MORGANTOWN, WV

FIGURE 2


EXCAVATE INORGANIC HOT SPOTS FROM LAGOON AREA (65 CU YD) AND SCRAPED AREA (360 CU YD)
SOLIDIFICATION OF INORGANIC HOT SPOTS (425 CU YD) TO REDUCE MOBILITY
PLACE SOLIDIFIED MASS IN LANDFILL TO PROVIDE FURTHER PROTECTION AGAINST CONTAMINANT MIGRATION
CAP LANDFILL WITH A 65,000 SQ FT MULTIMEDIA CAP.
• LONG-TERM O&M
– CAP INTEGRITY
– GW MONITORING
• DEED RESTRICTIONS
• MINIMIZE MIGRATION OF CONTAMINANTS AND INGESTION OR DERMAL CONTACT OF CONTAMINATED SOILS
CONSTRUCT A 360,000 SQ FT TREATMENT BED TO CONDUCT BIOREMEDIATION
RECIRCULATE WATER TO MAINTAIN MOISTURE CONTENT
EXCAVATE APPROXIMATELY 6,700 CU YD OF CONTAMINATED SOILS
PLACE EXCAVATED SOILS IN TREATMENT BED WITH 600 CU YD OF MANURE AND TILL SOIL SEMI-MONTHLY
SOILS WILL BE EXCAVATED ANNUALLY AND PLACED IN THE TREATMENT BED TO BE BIOREMEDIATED
REVEGETATE TREATMENT BED
• 500 CU YD FROM STREAM 1, 2, AND 3
• 2010 CU YD (BEST CASE) OR 3800 CU YD (WORST CASE) FROM SCRAPED AREA
• 2400 CU YD OR 4180 CU YD FROM LAGOON AREA
EXCESS WATER TO LOCAL POTW FOR TREATMENT
• CONTINUE TO EXCAVATE SOILS FROM LAGOON AREA (6700 CU YD/YEAR) UNTIL ALL SOILS ARE REMEDIATED.
• COMPLETION TIME WILL REQUIRE TWO YEARS FOR (BASE CASE VOLUME) AND FOUR YEARS (WORST CASE VOLUME) UNTIL ALL CONTAMINATED SOILS ARE IN TREATMENT BED.
• EACH SOIL LIFT WILL BE REMEDIATED BETWEEN 1 TO 4 YEARS, DEPENDING ON CONCENTRATION
• TOTAL REMEDIATION TIME 4.5 TO 9.5 YEARS, DEPENDING ON VOLUME AND CONCENTRATION OF CONTAMINATED SOIL.
• AT COMPLETION OF BIOREMEDIATION, SOILS IN TREATMENT BED WILL ACHIEVE A 1 x 10⁻⁶ RISK
• BASELINE PRESENT-WORTH COSTS – $8,332,000

ALTERNATIVE NUMBER 8

CAPPING (LANDFILL) BIOREMEDIATION (LAGOON AREA, SEDIMENTS, AND ORGANIC HOT SPOT FROM SCRAPED AREA) AND SOLIDIFICATION (INORGANIC HOT SPOTS) MORGANTOWN ORDNANCE WORKS SITE, MORGANTOWN, WV

FIGURE 3

Alternative 8B, the Preferred Remedial Action, contemplates excavation of soils and sediments in the lagoon area, scraped area, and streams for treatment using bioremediation. Treatment may be conducted in a lined treatment bed as described in the Focused Feasibility Study, or, alternatively, in an unlined treatment bed if, under this option, no leaching of excess water through the treatment bed will occur (one purpose of the bed liner is to collect any excess water and recirculate the water back to the treatment bed). Alternative 8B will locate the treatment bed within the area of contamination but in a location other than atop the landfill. EPA has selected Alternative 8B over Alternative 8A (treatment bed atop the landfill) because of the possibility of uneven settlement of the landfill and the possibility that the conduct of bioremediation activities on top of the cap may puncture the liner. Alternative 8B will require site preparation and grading prior to installation of the cap and treatment bed.

The inorganic hot spots (i.e., areas with high metal concentrations considered inhibitory to the bioremediation process and exceeding cleanup levels) from the scraped area (360 cubic yards) and the lagoon area (65 cubic yards) will be excavated and solidified and placed in the landfill before the landfill is capped.

Initially, approximately one-half of the contaminated soils and sediments will be placed in the bioremediation treatment bed. Manure or similar material will be added to provide sufficient nutrients for biological treatment. The bed will be rototilled periodically to mix the bed contents and to aerate the mixture to accelerate the biological treatment process. The treatment bed will be spray irrigated as necessary to maintain optimum moisture content. Additional untreated soil and nutrients will be added as biodegration proceeds and CPAH levels are reduced. Following treatment, the treatment bed containing remediated soils will remain in place and be revegetated. Excavated areas will be backfilled with clean soil and revegetated as the project proceeds.

Total time for completion of the bioremediation component of the Preferred Remedial Action is in the range of 5.5 years, depending on the time required to biodegrade the CPAHs present in the soil. Bioremediation has been proposed as a treatment technology at several other Superfund sites and has been successfully demonstrated at the Burlington Northern Superfund site in Brainerd, Minnesota. A 65 to 95 percent reduction of contaminants is anticipated for each year the bioremediation process is operated.

Alternative 6, the Contingency Remedial Action, involves excavation of approximately 16,700 cubic yards of sediments and soils from the lagoon area, scraped area, and streams and treatment of these soils/sediments using soil washing techniques. Soil washing will be completed in 170 working days based on using equipment with a 100 cubic yard per day capacity. The remedial action, exclusive of operation and maintenance for the cap, will be completed in 2.5 years. A 95 percent reduction in contaminants is anticipated.

Soil washing is a commercially available treatment process that has been successfully demonstrated at the General Refining Superfund site in Garden City, Georgia. Equipment will be mounted on a concrete pad within the area of contamination for operation. Treated soils will be returned to excavated areas after verification by EP toxicity testing that the treated material is not hazardous. The area would then be regraded and vegetated.

Any wetlands identified onsite will be restored to existing conditions, including original grade and drainage patterns, and revegetated with suitable indigenous species. Therefore, the remedial action is not expected to impact the functional value of the area. The actual extent of potential wetlands affected by remediation will be determined during the remedial design phase.

Operation and Maintenance

Both the Preferred Remedial Action and Contingency Remedial Action require operation and maintenance (O&M) of the landfill cap and vegetative cover for areas outside the landfill. Operation of a limited groundwater monitoring program is needed to identify potential groundwater release from the landfill, and short-term environmental monitoring (bioassays) will be conducted to measure the effectiveness of remediation of surface water and sediments. An O&M plan will be developed and implemented which provides a schedule and description of maintenance activities.

Groundwater monitoring will be conducted for an initial period of five years following installation of the landfill cap. During this period sampling and analysis data will be reviewed to determine whether the remedy provides adequate protection of human health and the environment. Groundwater monitoring will be discontinued if groundwater contamination is not detected at the end of the five year period. More extensive groundwater monitoring is unnecessary since groundwater is not a primary contaminant migration pathway.

XI. RATIONALE FOR REMEDY SELECTION

This analysis focuses on EPA's rationale for selecting both the Preferred Remedial Action and Contingency Remedial Action over other alternatives, using as a basis the Superfund evaluation criteria. A comparison between alternatives follows.

Alternative 1: No Action with Site Control

Alternative 1 does not achieve threshold criteria for adequate protection of human health and the environment, and does not comply with applicable or relevant and appropriate federal and state standards, requirements, criteria, or limitations. Current and future environmental risks would still exist from site runoff and access to the site by wildlife. Cleanup levels based on EPA guidance and criteria would not be met since contaminants would receive no treatment. The no action alternative would not permanently and significantly reduce the volume, toxicity, or mobility of hazardous waste at the site, and does not utilize permanent treatment technologies to the maximum extent practicable as mandated by CERCLA. The Preferred Remedial Action and Contingency Remedial Action satisfy all of the above criteria.

Alternative 2: Capping all Areas

Alternative 2 includes installation of RCRA cap over contaminated areas not meeting recommended cleanup criteria. Alternative 2 does not permanently and significantly reduce the volume, toxicity, or mobility of hazardous waste at the site, and does not utilize permanent treatment technologies to the maximum extent practicable. Containment using a cap for the entire site provides a low degree of protection of human health and the environment, permanence, and long-term effectiveness since wastes will be contained. Alternative 2 will not afford the high level of long-term protection provided by Alternatives 8B and 6, both of which utilize permanent treatment remedies.

Alternative 3: Soil Washing (All Areas)

Alternative 3 involves soil washing of all contaminated areas, including the landfill. EPA has determined that treatment of the soil within the landfill using soil washing (or bioremediation or incineration) is impractical and cannot reasonably be implemented because of the presence of large amounts of metal and debris which would have to be screened and removed from the soil prior to treatment.

Alternative 4: Soil Washing (Landfill and Inorganic Hot Spots) and Bioremediation (Lagoon Area, Sediments, and Organic Hot Spots)

As with Alternative 3, Alternative 4 involves soil washing of the landfill and is also impractical because of the presence of metal and debris which would have to be screened and removed from the landfill prior to treatment.

Alternative 5A and 5B: Soil Washing (Landfill) and Onsite Incineration (5A) or Offsite Incineration (5B), and

Alternative 7A and 7B: Capping (Landfill) and Onsite Incineration (7A) or Offsite Incineration (7B)

Alternatives 5 and 7 are considered together for purposes of this analysis because both alternatives use incineration as a treatment technique for the lagoon area, sediments, and scraped area. The Preferred Remedial Action and Contingency Remedial Action have been selected over alternatives employing thermal treatment because (1) incineration is significantly more expensive to implement than the other treatment technologies to be applied in these areas, but will not achieve a correspondingly higher reduction of contaminants, and (2) there are waste management and cost uncertainties associated with alternatives employing incineration because of the possibility that the resulting ash may exhibit hazardous waste characteristics.

The cost of Alternatives 5A and 7A (onsite incineration) is about three times the cost of Alternative 6 or 8B, while the cost of Alternatives 5B and 7B (offsite incineration) is five times the cost of Alternatives 6 or 8B. Incineration achieves only a marginal increase in contaminant reduction over soil washing and bioremediation (99% or greater reduction with incineration compared to 95% reduction with soil washing or bioremediation). As mentioned earlier, ashes resulting from the incineration process would have to be examined to determine whether they exhibited hazardous characteristics. Ashes exhibiting such characteristics would have to be managed as hazardous wastes and would, as a result, increase costs. There is a significant possibility that ashes would in fact be hazardous because of the presence of numerous "pellets" containing inorganic metals in the soils at the site.

In addition, Alternatives 5A and 5B contemplate soil washing of the landfill as described in Alternative 3. As mentioned earlier, soil washing of the landfill contents is not technically feasible or implementable because of the large amount of debris and metal in the landfill that would have to be removed prior to soil washing.

XII. STATUTORY DETERMINATIONS

Both the Preferred Remedial Action and the Contingency Remedial Action satisfy the remedy selection requirements of CERCLA and the National Contingency Plan. Each remedy provides protection of human health and the environment, achieves compliance with applicable or relevant and appropriate requirements, utilizes permanent solutions to the maximum extent practicable, is cost effective, and satisfies the statutory preference for treatment as a principal element.

Protection of Human Health and the Environment

The Preferred Remedial Action and Contingency Remedial Action protect human health and the environment through treatment of contaminated soils and sediments in streams, the former lagoon area, and the scraped area, and by capping the landfill area. Treatment of contaminated soils and sediments using soil washing or bioremediation and solidification will eliminate the threat of exposure from direct contact or ingestion. The cancer risk from exposure will be reduced to 1 x 10-6 for construction workers who would be exposed to soils during construction of an industrial facility after the remedial action is completed. By capping and closing the landfill area in accordance with RCRA landfill closure requirements, the risks of exposure through direct contact and ingestion and the likelihood of contaminant migration will be further reduced. There are no short-term threats associated with the selected remedies that can not be readily controlled. Deed restrictions will be necessary to prevent the long-term development of a residential area in this location.

Compliance With Applicable or Relevant and Appropriate Requirements

Each of the selected remedies will comply with all applicable or relevant and appropriate chemical-, action-, and location-specific ARARs as described below and shown in Table 7.

o Action-Specific ARARs - RCRA Subtitle C closure requirements will be met for capping of the landfill area. Wastewater generated during the soil washing process will be treated onsite and discharged to the municipal sewer system in accordance with Clean Water Act general pretreatment regulation. Wastes transported offsite will meet EPA offsite disposal policy and comply with DOT rules for materials transport. During site excavation and treatment, air monitoring will be performed to ensure that any air emissions comply with Federal and State Air Pollution Control Laws and Regulations, and OSHA requirements will be met for workers engaged in remedial activities. Wastes

treated by solidification or soil washing will be tested to confirm that the treated waste is not hazardous before being returned to excavated areas or placed in the onsite landfill.

o Chemical-Specific ARARS - Air emissions during remedial activities will be monitored for compliance with Clean Air Act and West Virginia rules and regulations.

o Location-Specific ARARs - None

o Other Criteria, Advisories, or Guidance To Be Considered

In developing risk-based cleanup levels, EPA has used advisory levels and guidelines that are "to be considered" for the remedial actions. These are:

- EPA-established action level of 500 mg/kg for lead.

- EPA-established Reference Doses (RfDs) used to develop risk-based cleanup levels for cadmium and copper.

- EPA Carcinogenic Potency Factors to develop risk-based cleanup levels for arsenic and CPAHs.

Cost-Effectiveness

The present worth cost of Alternative 6 is $9,393,000. The present worth cost of Alternative 8B is 8,332,000. The selected remedies are cost-effective because they provide overall protection in proportion to cost and meet all other requirements of CERCLA. Both remedies are 50 percent of the cost of Alternative 4 (combination of soil washing and bioremediation) and 21 percent of Alternative 5B (offsite incineration). Remedies 1 and 2 may be implemented at lower costs but do not provide for permanent treatment, do not meet ARARs, and do not provide as effective a level of protection of human health and the environment.

Preference for Treatment as a Principal Element

The selected remedies satisfy the statutory preference for remedies that employ treatment as a principal element to permanently reduce the volume, toxicity, or mobility of hazardous substances. By treating soils and sediments contaminated with CPAHs and inorganic metals using soil washing or bioremediation and solidification, the remedies address the principal threats posed by the site through use of treatment technologies.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the Preferred Remedial Action and Contingency Remedial Action represent the maximum extent to which permanent solutions and treatment technologies can be utilized while providing the best balance among the other evaluation criteria. Of those alternatives evaluated that are protective of human health and the environment and meet ARARs, the selected remedies provide the best balance of tradeoffs in terms of long-term and short-term effectiveness and permanence; cost; implementability; reduction in toxicity, mobility, or volume through treatment; State and community acceptance; and preference for treatment of soils and sediments by using soil washing or bioremediation and solidification.

Bioremediation and soil washing address the principal threats posed by contaminants in soil, achieving a significant reduction in CPAHs and inorganic metals (95 percent). The bioremediation process will require a longer implementation time since it involves biological treatment compared with the mechanical soil washing process. Containment by landfill capping, which is part of the selected remedies, does not reduce toxicity, mobility, or volume of the hazardous wastes. Therefore, ground water monitoring and maintenance of the cap will be required. Implementation of a treatment remedy for the landfill wastes is not considered practicable and probably would fail because of the large amount of contruction debris and metal placed in the landfill over many years. Such debris and metal would have to be carefully screened and removed before any treatment technology could be employed. Both remedies are protective of human health and the environment and are more cost effective than incineration which achieves only slightly higher degree of reduction of toxicity.

Table 7
ARARs Matrix

Action/ARAR	Alternative 8B	Alternative 6
1. Landfill closure with waste in place	Will meet RCRA landfill closure requirements with RCRA cap (40 CFR 264.300)	Will meet RCRA landfill closure requirements with RCRA cap (40 CFR 264.300)
2. Air emissions from soil excavation	Air emissions will be monitored for compliance with Clean Air Act and State Air Regulations	Air emissions will be monitored for compliance with Clean Air Act and State Air Regulations
3. Wastewater discharge to local municapal treatment system	Discharge will be treated to comply with Federal pretreatment standards (40 CFR 403.5)	Discharge will be treated to comply with Federal pretreatment standards (40 CFR 403.5)
4. Activity within a wetlands	Any activity in wetlands area will comply with Executive Order 11990	Any activity in wetlands area will comply with Executive Order 11990
5. OSHA requirements during onsite work activities	Onsite workers will meet OSHA training and medical monitoring requirements (40 CFR 1904, 1910, 1926)	Onsite workers will meet OSHA training and medical monitoring requirements (40 CFR 1904, 1910, 1926)
6. Offsite disposal of wastes	Will comply with EPA offsite disposal policy and DOT regulations	Will comply with EPA offsite disposal policy and DOT regulations

7. Cleanup levels for soil/sediment	Will meet for areas outside landfill.	Will meet for areas outside landfill.

MORGANTOWN ORDNANCE WORKS SITE
OPERABLE UNIT NO. 1 - DISPOSAL AREAS
MORGANTOWN, WEST VIRGINIA
RESPONSIVENESS SUMMARY

A. Overview

At the time of the public comment period, EPA had already selected two equally effective alternatives to address the areas requiring remediation at Operable Unit No. 1 of the Morgantown Ordnance Works Site. These areas include the inactive landfill, "scraped" area, former lagoon area, and streams. The two alternatives outlined in the Record of Decision (ROD) were (1) capping and soil washing or (2) capping, bioremediation, and solidification.

Judging from the comments expressed at the public meeting and during the public comment period, the residents and local officials accepted both alternatives with no preference for either alternative. The potentially responsible parties (PRPs) had some technical comments that are addressed later in this document.

This responsiveness summary is designed to summarize community concerns and activities at the Morgantown Ordnance Works Site and the EPA responses to those concerns. The responsiveness summary includes the following sections:

- Background on Community Involvement.
- Summary of Public Comments and Agency Response.
- Attachment: Community Relations Activities at Morgantown Ordnance Works Site.

B. Background on Community Involvement

The Ordnance Works Site lies adjacent to the communities of Morgantown and Westover, in north-central West Virginia along the banks of the Monongahela River. Westover is a small town of approximately 5,000 residents. Morgantown has a year-round population of approximately 30,700 and is the home of West Virginia University, one of the area's largest employers. Other major employers include the coal mining industry and various types of local industrial concerns, including glass, chemical, and pharmaceutical manufacturers.

The Monongahela River has long been central to the area's history, economy, and identity. The Monongahela joins the Allegheny River 75 miles to the north at Pittsburgh to become a major

headwater of the Ohio River. Fifty percent of Morgantown's drinking water is pumped from the river; the rest is obtained from a smaller stream. The city's water treatment plant is located slightly downstream and across the river from the Ordnance Works Site. In addition to being a major source of drinking water for both the Town of Westover and the City of Morgantown, the "Mon" is used for barge transport of coal, sand, and limestone. The river also is a popular recreation spot among area residents, who use the river for fishing and boating. According to city officials, the City of Morgantown is currently planning a river-front park, approximately three-quarters of a mile downstream from the Ordnance Works Site. The park will include a walkway, picnic tables, and a dock for boating and fishing. At present, a citizen task force is working to obtain Federal, state, and private funding for development of the park.

Most residents and community officials interviewed during the preparation of the Community Relations Plan characterized current public interest in the Ordnance Works site as fairly low. According to newspaper reports and statements from local officials, however, there were sporadic reports during the 1940s and 1950s from residents of unpleasant odors emanating from the plant and of paint on houses being discolored by plant emissions. Since then, local officials claim there have been no major complaints about the Ordnance Work Site until 1984. In January of that year, MIPA and West Virginia University announced a joint venture to develop a research park on the site property to attract corporate tenants. Almost simultaneously, EPA released a report indicating that PCBs had been found on the site. Following these two announcements, numerous articles about the EPA findings and development plans for the Ordnance Works Site appeared in the local press. Subsequently, MIPA hired a private contractor to remove barrels and soil contaminated with PCBs under the supervision of EPA.

During this sample period, several local citizens and community groups (including the League of Women Voters in Morgantown, the Monongahela Group of the West Virginia Sierra Club, and the West Virginia Public Interest Research Group [WVPIRG]) became concerned about water quality in the Morgantown area. In particular, these groups expressed concern about pollution threats to the Monongahela River, one of Morgantown's two principal sources of drinking water. According to residents interviewed for the preparation of the Community Relations Plan, a small but vocal group of residents was concerned about possible health risks if toxics leached from the Ordnance Works Site into Morgantown's drinking water via the Monongahela River. In addition, residents feared that the Borg-Warner Company was discharging contaminants into the river.

Group members reported that the League of Women Voters and the Sierra Club devoted several meetings during 1984 and 1985 to water quality issues associated with the Ordnance Works Site. League members wrote letters to various public officials and talked to WVDNR officials requesting

that the state sample area water. A well-attended public meeting, sponsored by the League of Women Voters, was held in Morgantown to discuss water quality in the Morgantown area. Local newspapers provided coverage of the meeting and related citizen activities. In response to citizen requests, WVDNR sampled water in Morgantown but found nothing significant. According to residents interviewed for the preparation of the Community Relations Plan, the level of community interest in the site has declined since 1985, and there have been few press reports about the Ordnance Works Site.

C. Summary of Public Comments and Agency Response

On July 12, 1989, a public meeting was held to present the results of the Focused Feasibility Study (FFS) prepared for Operable Unit No. 1 of the Morgantown Ordnance Works Site. Comments raised during the public meeting and during the public comment period, which ran from July 3, 1989 to August 2, 1989, are summarized below. The comments are categorized by relevant topics.

Concerns about Remedial Alternatives

1. A member of the public questioned whether the two remedial alternatives chosen were actually equally effective.

   - EPA Response - The EPA technical representative at the meeting explained that the agency had not expressed a preference for either alternative. Both alternatives were permanent treatment technologies, and the cost difference was $1 million or less, the representative stressed.

2. A member of the public asked whether the work at the site would be done by the Federal Government or by a private company.

   - EPA Response - The EPA explained that it could not answer the question because the work had not been contracted at that time.

3. A member of the public questioned how long the cleanup would take.

   - EPA Response - The EPA technical representative reiterated the approximate cleanup times of the two alternatives and referred the public to the fact sheet distributed at the meeting.

4. A member of the public questioned how much liquid waste would be generated by soil washing and how the waste would be handled. Would there be risk involved in shipping the waste off site for treatment?

   - EPA Response - The EPA technical representative explained that soil washing would generate several thousand gallons a day of waste. One stream of concentrated solvent would be transported off site for incineration. Another more dilute stream would be treated on site and discharged through the city sewer system. The offsite transportation would present no more of a risk than ordinary truck traffic in the industrial park does now.

Environmental Concerns

1. During the development of the community relations plan a major public concern that was identified was migration of site contaminants to the Monongahela River. This concern was taken into account during the development of remedial alternatives. The concern was brought up again during the public meeting. A member of the public questioned whether the drainage ditches led to the river and whether contaminants could be washed into the water supply.

   - EPA Response - The EPA technical representative pointed out that the ditches were actually intermittent drainage channels and that the remedial alternative would prevent future contamination via runoff to the Monongahela River.

2. A member of the public questioned whether there was a community watchdog organization that would oversee the cleanup.

   - EPA Response - The EPA public affairs representative explained in detail the Technical Assistance Grant process and invited anyone interested in the program to contact him directly.

Additional Concerns

1. A member of the public questioned whether the EPA was responsible for Superfund sites only. Several other sites across the river from the Morgantown Ordnance Works Site concern local residents.

   - EPA Response - The EPA public affairs representative explained those areas over which the EPA has jurisdiction and suggested that concerned residents contact their local and state authorities.

The following written comments were received subsequent to the public meeting.

Comments From Woodward-Clyde Consultants Representing the PRP Committee

1. The risk assessment for the recommended alternative should be weighted more toward the lack of significant current-use pathways or receptors rather than a hypothetical future-use scenario for construction workers.

EPA is required to consider both current and future exposure routes/pathways. A component of the risk analysis performed by EPA in the Focused Feasibility Study (FFS) is the exposure analysis in which potential future exposure pathways and routes of exposure are identified and expected level of exposure calculated. A consideration of expected land use (i.e., residential versus industrial) is identified and the necessary cleanup levels to ensure protection of human health calculated. Because the contaminated areas are located within an industrial park, a future use scenario for protection of construction workers exposed to soils and sediments during construction of an industrial facility is considered a plausible scenario and was used in developing cleanup levels. This approach is considered reasonable and consistent with Superfund policy.

2. The cleanup level for CPAH should be 100 mg/kg. This cleanup level was proposed by EPA Region IV for the Live Oak, Florida, Superfund site.

Cleanup levels should be based on individual site-specific risk assessments. Cleanup levels for contaminants at one Superfund site can not be simply transferred for use at another Superfund site where site conditions, exposure routes, physiological conditions, etc. will vary.

3. The extent of site remediation should be based only on the concentrations of CPAH and arsenic that exceed cleanup levels. Target cleanup levels for chromium, mercury, zinc, copper, and lead should not be used as a basis for site remediation.

The ROD establishes cleanup levels for CPAHs, arsenic, cadmium, lead, and copper. All of these contaminants have been identified in soil or sediments at concentrations that exceed risk-based cleanup levels, and therefore site remediation is required. Cleanup levels are not proposed for mercury, zinc, and chromium because the maximum concentrations detected during the Remedial Investigation sampling are below the proposed cleanup levels. Cleanup levels for all contaminants of concern, including metals, were established based on the revised risk assessment in the FFS.

4. Wetlands are not present at the site, as supported by a soil survey of the three streams conducted by Woodward Clyde Consultants. Proposed alternatives affected by potential wetlands should be reviewed and revised. For example, the biotreatment alternative should be modified by eliminating the protective liner.

Wetlands have not been identified in the ROD as being located along the stream banks on the site. Any wetlands identified onsite in other areas will be restored to existing conditions. The actual extent of wetlands affected by remediation will be determined during the remedial design phase. The Preferred Remedial Action states that bioremediation may be conducted in either a lined or unlined treatment bed.

5. The most appropriate remedial action alternative would be offsite disposal of "hot spots" from the scraped area and former lagoon, capping of the scraped area and former lagoon area, capping the landfill, and deed restrictions.

The remedy proposed by Woodward-Clyde would involve offsite disposal of "hot spots" with a total volume of about 1,000 cubic yards of soil. Hot spots are defined as soil containing more than 300 mg/kg CPAH. (Reference: December 14, 1988 Woodward-Clyde Report, "Assessment of the RI/FS/ROD for the Ordnance Works Site, Morgantown, West Virginia.) The remaining areas of contamination would be capped. This volume of 1,000 cubic yards to be treated compares with a total of 13,885 cubic yards of soil and sediments contaminated with CPAHs and metals that will be permanently treated using bioremediation or soil washing techniques. Removal offsite of a small quantity of waste material and capping the remaining contaminated areas, as suggested in the Woodward-Clyde comments, does not permanently and significantly reduce the volume or toxicity of hazardous waste at the site, does not utilize permanent treatment technologies to the maximum extent practicable, and does not satisfy CERCLA's preference for remedies that employ treatment as a principal element.

6. If the alternative involving removal of "hot spots," capping, and institutional controls is not recommended, then biotreatment is a potentially appropriate remedial technology.

Alternative 8B, bioremediation and containment, is selected in the ROD as the Preferred Remedial Action.

7. Extrapolation of results from other biotreatment studies to the Morgantown site, such as the Burlington Northern Superfund site, is risky.

EPA acknowledges that site-specific design conditions are important and has recommended design studies prior to implementing the Preferred Remedial Action. It is appropriate, however, to identify other Superfund sites and to reference literature studies where bioremediation has been used.

8. A lined treatment bed should not be used for bioremediation because of increased cost and the fact there are no wetlands at the site.

The ROD states that bioremediation may be conducted in either a lined or unlined treatment bed for Alternative 8B.

9. Soil washing was previously not recommended as a remedial alternative in the earlier Feasibility Study (Weston, 1988) and is an unproven technology.

The Focused Feasibility Study included identification and screening of all applicable treatment technologies in light of revised cleanup levels, costs, compliance with ARARs, and other site specific conditions. Recent EPA policy directives advocate the use of new and innovative technologies which have the potential to provide similar treatment performance compared to demonstrated technologies at comparable costs. EPA therefore considers it entirely appropriate to consider soil washing even though this technology was previously not evaluated in detail.

10. There is no documentation or data presented indicating that the soil washing solvent extraction process can treat the soil matrix at the Ordnance Works site. The suggested process (BEST) was developed for treatment of organic sludges, not heterogenous soils containing CPAH.

Soil washing is a commercially available process and is marketed by several vendors. As stated on page 4-18 of the Focused Feasibility Study, the BEST process was selected as a representative process for discussion and cost estimating purposes, and other soil washing processes may be equally viable.

11. The BEST process is designed for particles less than 1-inch in diameter. Larger aggregates at the Morgantwon site would require expensive pre-screening and crushing, and would be difficult to implement.

Discussion in the Focused Feasibility Study acknowledges that prescreening of large material would be required and includes this technology in the cost estimate for Alternative 6. Screening, grinding, or crushing are all considered demonstrated materials handling operations.

12. The stated costs in Alternative 6 are high and not adequately detailed.

Costs are considered reasonable for an initial engineering estimate and are presented in detail in the Appendix to the Focused Feasibility Study.

13. If the solvent extraction process fails, no other alternative technologies have been considered as backup technologies.

Soil washing (solvent extraction) is considered to be technically feasible and has been selected at other Superfund sites. EPA has selected Alternative 8B (bioremediation) as the Preferred Remedial Action and Alternative 6 (soil washing) as the Contingency Remedial Action.

Comments from Hope Gas, Inc.

The amount of airborne particulates should be reduced, and nearby workers and residents should be advised of action taken to minimize the release of air contaminants.

Both the Preferred Remedial Action and Contingency Remedial Action provide for monitoring of air emissions for compliance with Federal and State air pollution regulations. A risk assessment using this data will determine the risk to onsite and offsite receptors.

Comment from Baker & Armistead, Attorney at Law

The Focused Feasibility Study erroneously refers to the current owner as Morgantown Industrial Park.

The Record of Decision states that the current owner is Morgantown Industrial Park Associates, Limited Partnership ("MIPA").

Comment from GE Specialty Chemicals

The Proposed Plan provides an inaccurate description of Borg-Warner's and GE's presence at the site.

The Record of Decision has corrected any inaccuracies in the description of Borg-Warner's and GE's presence at the site.

ATTACHMENT

COMMUNITY RELATIONS ACTIVITIES
AT MORGANTOWN ORDNANCE WORKS SITE

Community relations activities conducted at the Morgantown Ordnance Works Site to date have included the following:

- U.S. EPA Contractor conducted interviews with local officials and interested residents (January 1988).
- EPA prepared community relations plan (February 1988).
- EPA established five information repositories. The repository of public record was established at the Morgantown Public Library.
- EPA released the RI/FS to the public (February 1988).
- EPA established a public comment period on the RI/FS (February 16, 1988 to March 16, 1988).
- EPA issued a Fact Sheet summarizing the RI/FS for the site (March 1988).
- EPA held a public meeting on the RI/FS (March 1988).
- The first Record of Decision (ROD) was signed (March 31, 1988).
- Additional comments received from the PRPs resulted in a Focused Feasibility Study (FFS).
- EPA released the FFS to the public. A copy of the FFS was sent to the Information Repository of Record (July 3, 1989).
- EPA developed and released a Fact Sheet summarizing the FFS and sent Fact Sheets to five information repositories (July 3, 1989).
- EPA ran an advertisement in the Morgantown Dominion-Post summarizing the FFS, announcing the public meeting, and announcing the public comment period (July 3, 1989).

- EPA set a public comment period on the FFS (July 3, 1989 to August 9, 1989).

- EPA held a public meeting July 12, 1989, at the Morgantown Public Library to answer questions about the selected alternatives for the site.